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NATIONAL DAM INSPECTION PROGRAM. LYMAN RUN DAM, NDS I.D. NUMBER--ETC(U)
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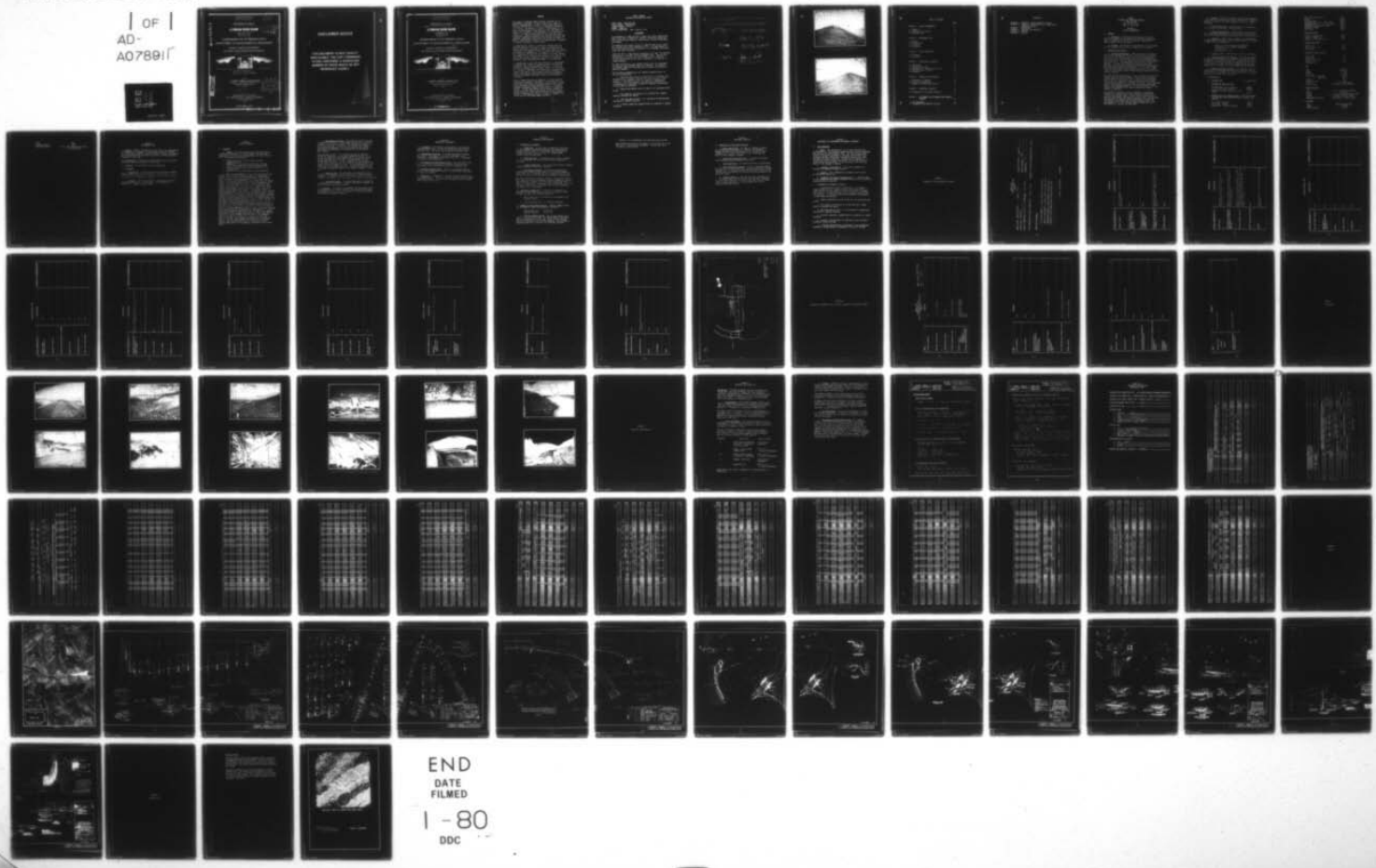

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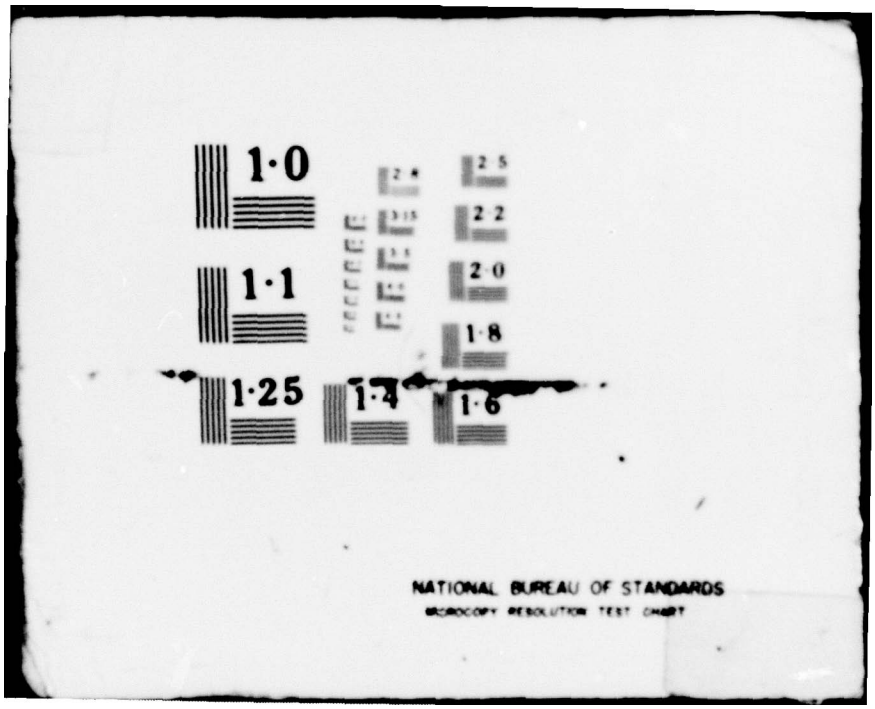
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NATIONAL BUREAU OF STANDARDS

SUSQUEHANNA RIVER BASIN
LYMAN RUN, POTTER COUNTY

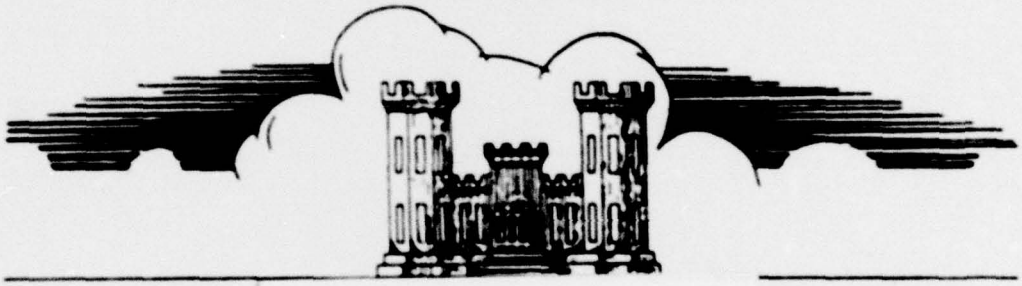
PENNSYLVANIA

LYMAN RUN DAM

NDS ID NO. PA-29
DER ID NO. 53-49

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



Prepared By
L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG, PENNSYLVANIA
15931

FOR
DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT CORPS OF ENGINEERS
BALTIMORE, MARYLAND
21203

SEPTEMBER, 1979

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SUSQUEHANNA RIVER BASIN,
LYMAN RUN, POTTER COUNTY,

PENNSYLVANIA.

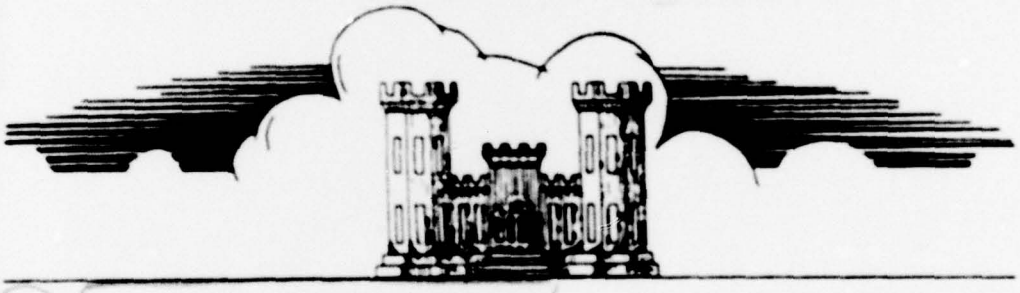
National Dam Inspection Program.

LYMAN RUN DAM.

NDS ID NO. PA-29,
DER ID NO. 53-49,
I.D.

COMMONWEALTH OF PENNSYLVANIA,
DEPARTMENT OF ENVIRONMENTAL RESOURCES,

PHASE I INSPECTION REPORT.
NATIONAL DAM INSPECTION PROGRAM



(15) DACW31-79-C-0009

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FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT CORPS OF ENGINEERS
BALTIMORE, MARYLAND
21203

(11) SEPTEMBER 1979

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM INSPECTION REPORT

NAME OF DAM: Lyman Run Dam
STATE LOCATED: Pennsylvania
COUNTY LOCATED: Potter
STREAM: Lyman Run
DATE OF INSPECTION: June 27 and 28, 1979

[contd from p. 1]

ASSESSMENT

The assessment of Lyman Run Dam is based upon visual observations made at the time of inspection, review of available records and data, hydrologic and hydraulic computations, and past operational performance.

The inspection and review of data of Lyman Run Dam did not reveal any problems which require emergency action. The dam appears to be in good condition with the exception of the seepage, well maintained and safely operated.

Lyman Run Dam is a high hazard-intermediate size dam. The Spillway Design Flood is the PMF (Probable Maximum Flood). The spillway and reservoir are capable of controlling the PMF. Based on criteria established by the Corps of Engineers, the spillway is termed adequate.

The long term effect of the seepage exiting from the downstream toe area and right abutment should be evaluated. In addition, the seepage conditions occurring under prolonged high reservoir levels is unknown.

The following recommendations and remedial measures should be instituted immediately.

1. Measuring weirs should be installed at all seepage areas and monitored at frequent intervals and during periods of heavy rainfall or high reservoir level for quantity of seepage and turbidity. The effectiveness of the grouting program should be evaluated by a registered professional engineer knowledgeable in earth dams and grouting.

2. Regular maintenance should be made on the upstream paving blocks.

3. The cracks in the bottom of the spillway exit channel should be repaired and sealed.

4. The slide gate on the 5' x 5' box should be operated and lubricated at regular intervals.

5. A safety inspection program should be conducted at regular intervals.

6. Access to the dam should be improved so that the dam is accessible during flooding.

7. A warning system should be developed to warn downstream residents of large spillway discharges or failure of the dam.

SUBMITTED BY:

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS

Kuang-hwei Chuang

Kuang-hwei Chuang, P.E.

SEP 14 1979

Date

R. Jeffrey Kimball

R. Jeffrey Kimball, P.E.

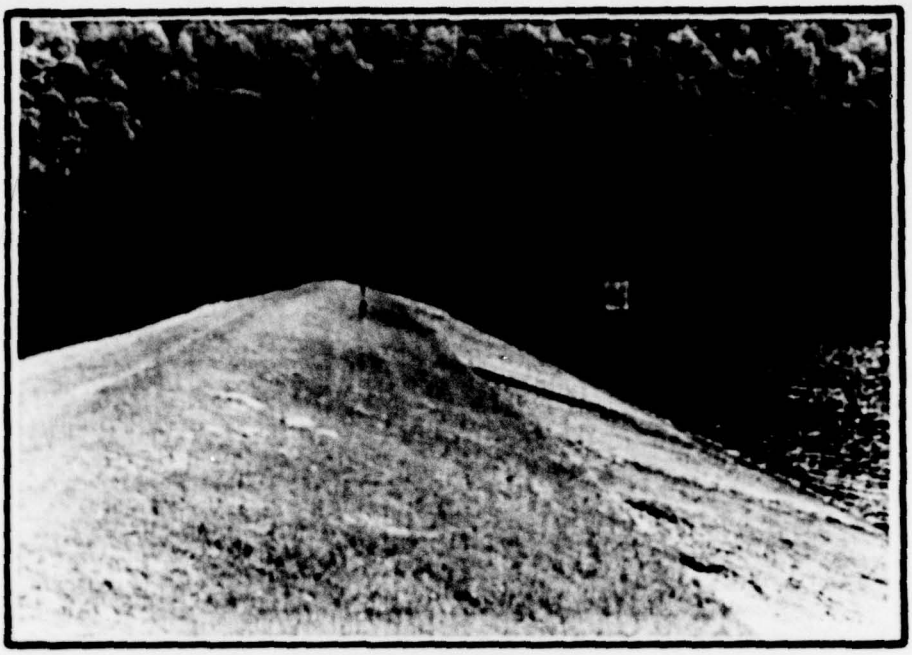
APPROVED BY:

25 Sep 79

Date

James W. Peck

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer



Overview of upstream slope - Note drain line control structure in reservoir.

Overview of downstream slope.

TABLE OF CONTENTS

APPENDICES

PHASE I
NATIONAL DAM INSPECTION PROGRAM
LYMAN RUN DAM
NDI I.D. NO. PA 29
DER I.D. NO. 53-49

SECTION 1
PROJECT INFORMATION

1.1 General.

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Lyman Run Dam is an earthfill dam 920 feet long and 50 feet high. The top width of the dam is 14 feet. The upstream slope is 3H:1V and the downstream slope is 2.5H:1V. The upstream slope is protected against wave action with an 8" layer on concrete block riprap between elevation 1645.0 and 1632.0. The embankment consists of two classes of material. A central core consists of selected impervious material. The upstream and downstream portions of the embankment are constructed using pervious material. A core trench 5 feet deep and 16 feet wide is constructed under the axis of the dam. A line of steel sheet piling is driven along the centerline of the trench to bedrock.

The outlet conduit consists of a 5' by 5' reinforced concrete box culvert under the earth embankment. Three cutoff collars are located along the culvert. A 3' by 3' sluice gate is operated from on top of a twelve foot square reinforced concrete tower, located 148 feet upstream of the axis of the dam. At the discharge end of the box culvert is a scour hole with large hand placed riprap. The discharge channel out of the scour hole is 200 feet long with a bottom width of 8 feet to the natural stream channel of Lyman Run.

The spillway is located at the left abutment of the dam and consists of a concrete lined chute. The weir consists of a 125 foot long concrete ogee. A three foot thick curtain wall extends 6 feet beneath the bottom of the weir base. The spillway exit channel is a concrete chute consisting of a reinforced concrete slab with reinforced concrete retaining walls. The exit channel is 375 feet long and ranges in grade from 5% to 20% ending in a concrete stilling basin.

→ [cont'd on p. 1-2]

b. Location. The dam is located on Lyman Run approximately 6 miles west of Galeton, Potter County, Pennsylvania. Lyman Run Dam can be located on the Cherry Springs, U.S.G.S. 7.5 minute quadrangle.

c. Size Classification. Lyman Run Dam is an intermediate size structure (50 feet high, 1428 acre-feet).

d. Hazard Classification. Lyman Run Dam is a high hazard dam. Downstream conditions indicate that loss of more than a few lives is probable should the structure fail (See Section 3.1e).

e. Ownership. Lyman Run Dam is owned by the Commonwealth of Pennsylvania, Department of Environmental Resources. Correspondence should be addressed to:

Bureau of Operation Resources Management
Department of Environmental Resources
P.O. Box 1467
Harrisburg, PA 17120

f. Purpose of Dam. Lyman Run Dam is used for recreation.

g. Design and Construction History. The dam was designed by the Chester Engineers for the General State Authority and Department of Environmental Resources. The dam was constructed by Elmhurst Construction Company and completed in 1951. In 1972, construction began on protective measures for scour and seepage and for grouting the right abutment and dam foundation.

h. Normal Operating Procedures. The reservoir level is maintained at the spillway crest elevation (elevation 1635.0). Excess inflow is discharged over the spillway crest. The drain line gate is operated twice each year.

1.3 Pertinent Data.

a. Drainage Area. 17.9 square miles

b. Discharge at Dam Site (cfs).

Maximum known flood at dam site	Unknown
5' x 5' box culvert capacity	Unknown
Emergency spillway capacity at top of dam	28,257

c. Elevation (U.S.G.S. Datum) (feet) - Elevations worked from spillway crest elevation shown on construction drawings.

Top of dam - low point	1651.2
Top of dam - design	1652.5
Maximum pool - design surcharge	1652.5

Full flood control pool	N/A
Normal	1635.0
Spillway crest	1635.0
Upstream portal 5' x 5' box culvert	1600.2
Downstream portal 5' x 5' box culvert	1599.8
Streambed at centerline of dam	1601.0
Maximum tailwater	None
Toe of dam	1599.8

d. Reservoir (feet).

Length of maximum pool	5000
Length of normal pool	3500
Length of flood control pool	N/A

e. Storage (acre-feet).

Normal pool	680
Flood control pool	N/A
Top of dam	1428

f. Reservoir Surface (acres).

Top of dam	53
Maximum pool	53
Flood control pool	N/A
Normal pool	40
Spillway crest	40

g. Dam.

Type	Earthfill
Length	920 feet
Height	50 feet
Top width	14 feet
Side slopes - upstream	3H:1V
- downstream	2.5H:1V
Zoning	Yes
Impervious core	Yes
Cutoff	Sheet pile cutoff
Grout curtain	Partial, on right abutment

h. Reservoir Drain.

Type	5' x 5' concrete box culvert
Length	300 feet
Closure	3' x 3' sluice gate on control tower
Access	By boat to control tower
Regulating facilities	Sluice gate on control tower

i. Spillway.

Type	Concrete lined chute
Length	125 feet
Crest elevation	1635.0

Gates	None
Upstream channel	Lake
Downstream channel	375 foot long concrete lined chute to stilling basin

SECTION 2
ENGINEERING DATA

2.1 Design. Review of information in the files of the Commonwealth of Pennsylvania, Department of Environmental Resources revealed that construction drawings, inspection reports, permits, photographs and correspondence were available for review. All this data was reviewed for this study.

2.2 Construction. Construction progress reports and concrete and compaction tests were reviewed for this study.

2.3 Operation. No operating records are maintained.

2.4 Evaluation.

a. Availability. Engineering data were provided by PennDER Bureau of Dams and Waterways Management. The state part superintendent accompanied the inspection team to answer questions on operation and maintenance of the dam.

b. Adequacy. The type and amount of design data and other engineering information is substantial. The information is sufficient to complete a Phase I Report.

SECTION 3
VISUAL INSPECTION

3.1 Findings.

a. General. The onsite inspection of Lyman Run Dam was conducted by personnel of L. Robert Kimball and Associates accompanied by the state park superintendent on June 27 and 28, 1979. The inspection consisted of:

1. Visual inspection of the retaining structure, abutments and toe.
2. Examination of the spillway facilities, portions of any outlet works, and other appurtenant works.
3. Observations affecting the runoff potential of the drainage basin.
4. Evaluation of the downstream area hazard potential.

b. Dam. The dam appears to be in good condition with the exception of the extensive seepage areas. The dam appears to conform closely to the construction drawings. From a brief survey conducted during the inspection, it was noted that the crest of the dam is approximately 1.1 feet lower than the design height. The upstream slope is 3H:1V and the downstream slope is 2.5H:1V. The crest width is 14 feet. On the upstream slope between elevations 1632.0 and 1645.0 is a concrete block slope paving. This paving is in fair condition. Some of the paving blocks show settlement and cracking. In addition, grass is growing between some of the blocks. The remainder of the upstream slope, downstream slope and crest are covered with grass. Along the downstream toe to the left of the principal spillway discharge channel, is a recently placed rock drain. The exposed portion of this drain shows a coarse gravel fill with a corrugated metal pipe draining to the principal spillway discharge channel. Seepage from this drain during the inspection was measured to be 9 gallons per minute. An extensive seepage zone was located at the toe of the dam at the right abutment. The seepage during the inspection was measured at 112 gallons per minute. This area has been the subject of studies immediately after filling. A weir was installed after construction but has subsequently been washed out. In 1974, a grouting program was conducted to cut off some of the seepage. After construction, seepage readings were as high as 400 gallons per minute. A small seepage zone was noted to the immediate right of the reservoir drain (5' x 5' box) on the downstream slope of the dam. This seepage was estimated at 4 gallons per minute. The park superintendent indicated that this seepage zone has just recently been noticed. A large wet area is present beyond the toe of the dam and covers most of the valley floor.

c. Appurtenant Structures. The reservoir level at the time of inspection was 1635.1. The emergency spillway and facilities appeared to be in good condition. The concrete weir appeared to be in good condition. In addition, the spillway exit channel retaining walls appeared to be in good condition and stable. Some cracks have developed in the bottom slab of the spillway exit channel.

The slide gate on the 5' x 5' concrete box was not operated during the inspection. In addition, examination of the 5' x 5' box was not conducted except examination of the exposed portion at the downstream toe of the dam. A minimal amount of flow was exiting from the 5' x 5' box. Operation of the slide gate in the control structure can only be made by gaining access to the intake structure by means of a boat. At the discharge end of the drain line is a riprapped scour hole. Beyond this scour hole is a riprapped trapezoidal channel to the natural streambed of Lyman Run.

d. Reservoir Area. The watershed is covered mostly with woodland. The reservoir slopes are moderate to steep but are not susceptible to massive landslides which would affect the storage volume of the reservoir or overtopping of the dam by displacing water.

e. Downstream Channel. The downstream channel of Lyman Run is moderately wide and gentle. Homes are scattered throughout the valley bottom to the town of Galeton.

3.2 Evaluation. In general, the embankment and appurtenant structures appeared to be in good condition and adequately maintained. The seepage areas at the toe of the dam are of concern and should be monitored at regular intervals.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures. The reservoir is maintained at the spillway crest elevation 1635.0. The excess inflow discharges over the spillway crest. The drain line is operated twice each year.

4.2 Maintenance of the Dam. No planned maintenance schedule is utilized. Maintenance of the dam is performed by the Department of Environmental Resources, Park Staff. Maintenance of the dam is considered good.

4.3 Maintenance of Operating Facilities. The slide gate on the 5' x 5' concrete box is reportedly operated twice each year. Maintenance of the operating facilities is considered good.

4.4 Warning System in Effect. There is no warning system in effect to warn downstream residents of large spillway discharges or failure of the dam.

4.5 Evaluation. Maintenance of the dam and operating facilities is considered good. There is no warning system in effect to warn downstream residents. The dam is not accessible during flooding which should be corrected.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features.

a. Design Data. No hydrologic information is available. The only hydraulic information available were memorandums on hydraulic model studies for the spillway which indicate the spillway can function up to 25,000 cfs. Studies beyond 25,000 cfs were not performed.

b. Experience Data. The maximum flood to date is unknown. It is reported that the spillway has performed adequately in the past.

c. Visual Observations. The spillway and spillway discharge channel appeared to be in good condition.

d. Overtopping Potential. Overtopping potential was investigated through the development of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir and spillway.

The Corps of Engineers, Baltimore District, has directed that the HEC-1 Dam Safety Version systemized computer program be utilized. The program was prepared by the Hydrologic Engineering Center (HEC), U.S. Army Corps of Engineers, Davis, California, July, 1978. The major methodologies or key input data for this program are discussed briefly in Appendix D.

5.2 Evaluation Assumptions. To enable us to complete the hydraulic and hydrologic analysis for this structure, it was necessary to make the following assumptions.

1. Water level prior to flood was at the spillway crest elevation 1635.0.

2. No flow through the 5' x 5' box was considered.

5.3 Summary of Overtopping Analysis. Complete summary sheets for the computer output are presented in Appendix D.

Peak Inflow (PMF)	28,821 cfs
Spillway Capacity	28,527 cfs

a. Spillway Adequacy Rating. The Spillway Design Flood (SDF) for this dam is the PMF. The SDF is based on the hazard and size classification of the dam. Based on the following definition provided by the Corps of Engineers, this spillway is rated as adequate as a result of our hydrologic analysis.

Adequate - For intermediate size dams which pass the PMF.

The spillway and reservoir are capable of controlling 99% of the PMF without overtopping the embankment. The spillway can be considered to pass the PMF.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. No signs of slumping or erosion were noted during the inspection. However, the excessive seepage exiting from the downstream toe of the dam and right abutment are of concern (See section 3.1b). The long term effect of this seepage is unknown.

b. Design and Construction Data. No stability analyses were conducted during the design of this dam.

c. Operating Records. No operating records are maintained.

d. Post Construction Changes. In 1974, a grouting program was conducted to cutoff some of the seepage exiting from the right abutment toe. No seepage readings are available from just before grouting and after grouting to determine the effectiveness of the grouting program.

e. Seismic Stability. The dam is located in seismic zone 1. No seismic stability analysis has been performed. Normally, it can be considered that if a dam in this zone is stable under static loading conditions, it can be assumed safe for any expected earthquake loading.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. The dam appears to be in good condition with the exception of the extensive seepage exiting from the downstream toe area and the right abutment area. The visual observations, review of available information, hydrologic and hydraulic calculations and past operational performance indicate that Lyman Run Dam's spillway is adequate. The spillway is capable of controlling the PMF without overtopping. No adequate stability analyses have been performed for the structure. The long term effect of the seepage is unknown.

b. Adequacy of Information. Sufficient information is available to complete a Phase I Report.

c. Urgency. The recommendations suggested below should be implemented immediately.

d. Necessity for Further Investigations. To complete some of the recommendations/remedial measures outlined below, additional investigations are required.

7.2 Recommendations/Remedial Measures

1. Measuring weirs should be installed at all seepage areas and monitored at frequent intervals and during periods of heavy rainfall or high reservoir levels for quantity of seepage and turbidity. The effectiveness of the grouting program should be evaluated by a registered professional engineer knowledgeable in earth dams and grouting.

2. Regular maintenance should be made on the upstream paving blocks.

3. The cracks in the bottom of the spillway exit channel should be repaired and sealed.

4. The slide gate on the 5' x 5' box should be operated and lubricated at regular intervals.

5. A safety inspection program should be conducted at regular intervals.

6. Access to the dam should be improved so that the dam is accessible during flooding.

7. A warning system should be developed to warn downstream residents of large spillway discharges or failure of the dam.

APPENDIX A

CHECKLIST, VISUAL INSPECTION, PHASE I

CHECK LIST
VISUAL INSPECTION
PHASE I

NAME OF DAM Lyman Run Dam COUNTY Potter STATE Pennsylvania ID# PA 29

TYPE OF DAM Earthfill HAZARD CATEGORY High

DATE(s) INSPECTION June 27, 28, 1979 WEATHER Clear, warm TEMPERATURE 75°

POOL ELEVATION AT TIME OF INSPECTION 1635.1 M.S.L. TAILWATER AT TIME OF INSPECTION 1597.4 M.S.L.

INSPECTION PERSONNEL:

R. Jeffrey Kimball, L. Robert Kimball and Associates

James T. Hockensmith, L. Robert Kimball and Associates

Kuang-hwei Chuang, L. Robert Kimball and Associates

Richard A. Linn, Regional Park Superintendent, DER

James T. Hockensmith RECORDER

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None in embankment, some cracks in upstream slope paving.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Horizontal alignment appears to be good. Vertical alignment - ranges from 1651.4 to 1652.0	
RIPRAP FAILURES	None.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATION	Upper part of upstream slope, crest and downstream slope grassed - mowed.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Appear to be good, with the exception of the seepage occurring on the downstream slope of the right abutment.	
ANY NOTICEABLE SEEPAGE	Junction of toe and right abutment -112 gpm, seepage to the right of the 5' x 5' box - 4 gpm, seepage from downstream toe area to the left of the principal spillway discharge channel - 9 gpm.	
STAFF GAUGE AND RECORDER	None,	
DRAINS	Toe area drained by rock drain with corrugated metal pipe.	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	N/A	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL AND HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	
STAFF GAUGE OR RECORDER	N/A	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Only the downstream end of the 5' x 5' box culvert exposed. Condition appears to be good.	
INTAKE STRUCTURE	Intake structure in reservoir area, not observed.	
OUTLET STRUCTURE	None.	
OUTLET CHANNEL	Riprapped and in good condition.	
EMERGENCY GATE	Unobserved during inspection.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	In good condition.	
APPROACH CHANNEL	Lake.	
DISCHARGE CHANNEL	Some cracks in bottom of channel.	
BRIDGE AND PIERS	None.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE AND PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

DOWNSTREAM CHANNEL

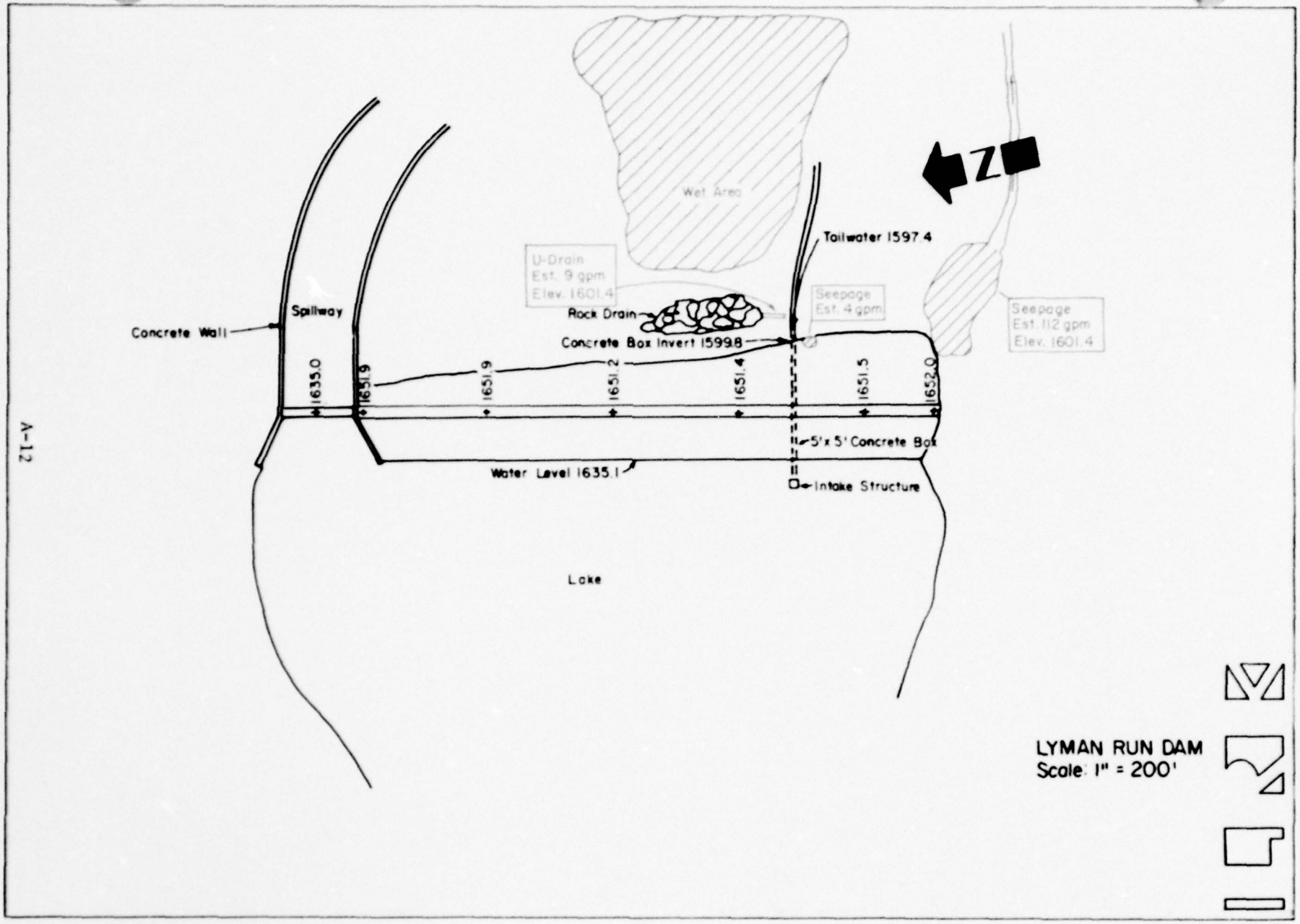
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Wide and relatively flat. No obstructions.	
SLOPES	Stable.	
APPROXIMATE NO. OF HOMES AND POPULATION	Approximately 400 homes (1500 people).	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderate, stable.	
SEDIMENTATION	Does not appear to be excessive.	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	Several on downstream slope but may not be functional.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	


Wet Area
N
Tailwater 1597.4
U-Drain
Est. 9 gpm
Elev. 1601.4
Seepage
Est. 4 gpm
Seepage
Est. 112 gpm
Elev. 1601.4
Rock Drain
Concrete Wall
Spillway
Concrete Box Invert 1599.8
1635.0
1651.9
1651.9
1651.2
1651.4
1651.5
1652.0
5'x 5' Concrete Box
Water Level 1635.1
Intake Structure
Lake
LYMAN RUN DAM
Scale: 1" = 200'

APPENDIX B

CHECKLIST, ENGINEERING DATA, DESIGN, CONSTRUCTION, OPERATION, PHASE I

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Lyman Run Dam

ID# PA 29

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	U.S.G.S. Quadrangle.
CONSTRUCTION HISTORY	DER files.
TYPICAL SECTIONS OF DAM	Construction drawings.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS RAINFALL/RESERVOIR RECORDS	Construction drawings. Construction drawings. None. None. None.

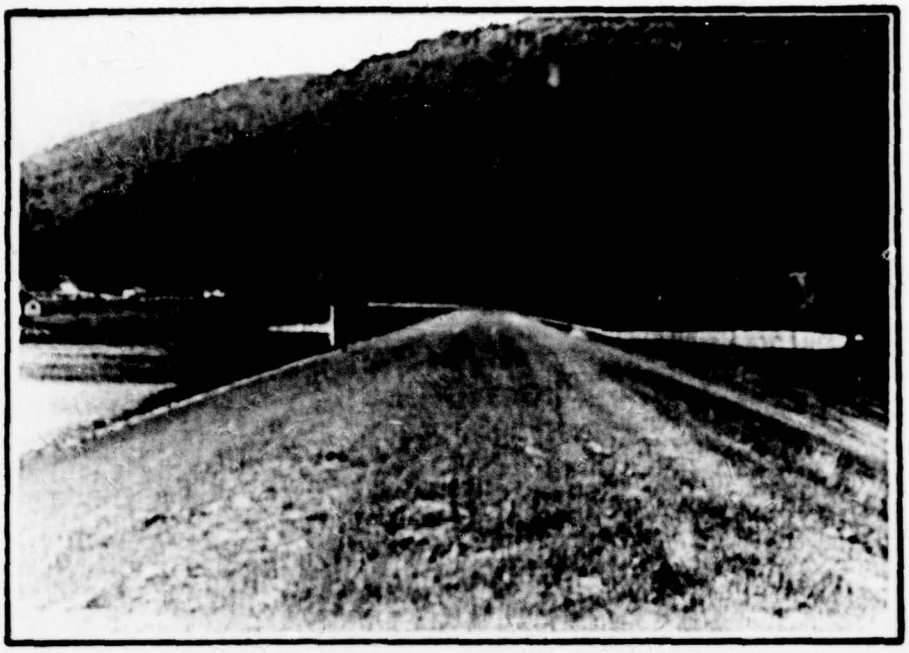
ITEM	REMARKS
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Construction drawings and DER files.
POST-CONSTRUCTION SURVEYS OF DAM	Yes, all contained in DER files.
BORROW SOURCES	Construction drawings.

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	Grouting program conducted in 1974.
HIGH POOL RECORDS	None.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.'
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None.
MAINTENANCE OPERATION RECORDS	None.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	Construction drawings.
OPERATING EQUIPMENT PLANS & DETAILS	Construction drawings.

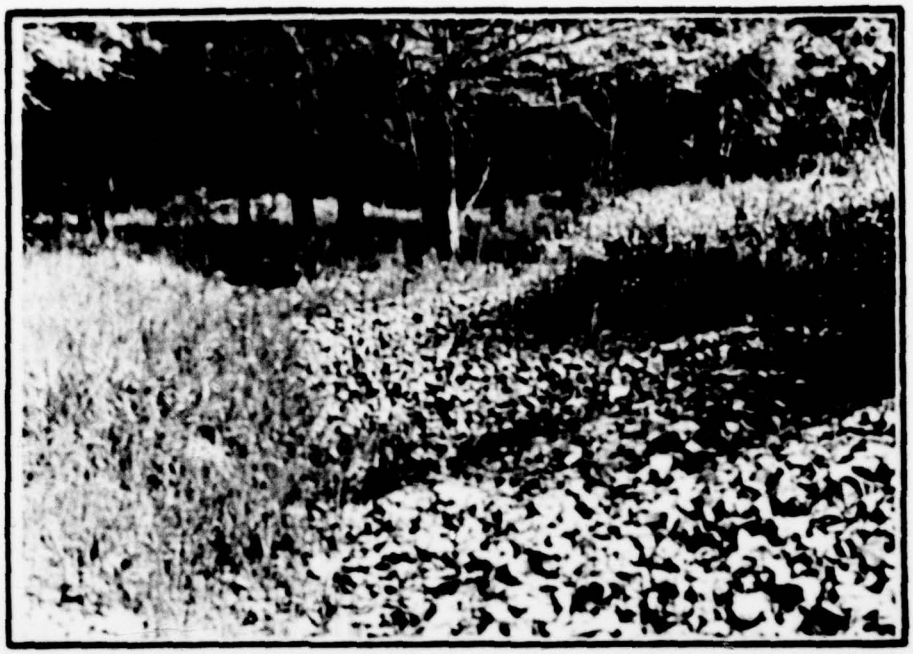
APPENDIX C

PHOTOGRAPHS



Crest of dam looking toward spillway (left abutment).

Tailwater at toe of dam.

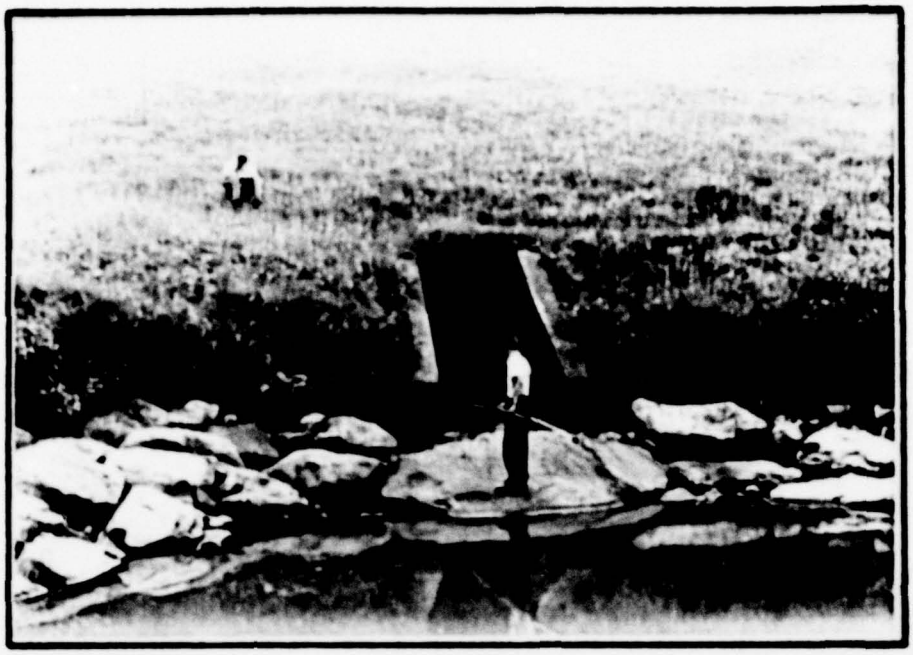


Rock underdrain beyond toe of dam.

Outlet end of rock underdrain.

Monitors on downstream slope near right abutment.

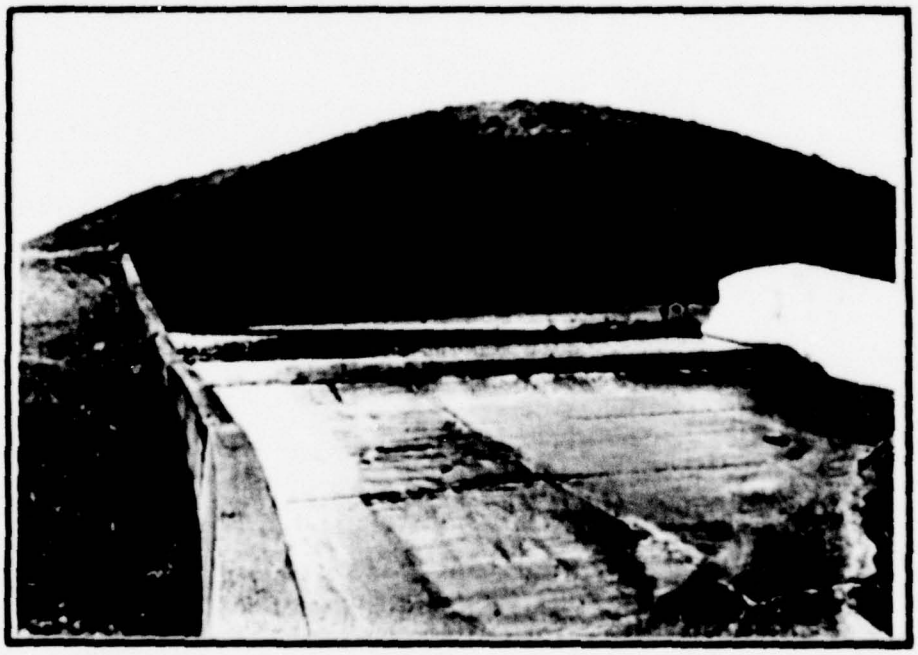
Major seepage area at right abutment.



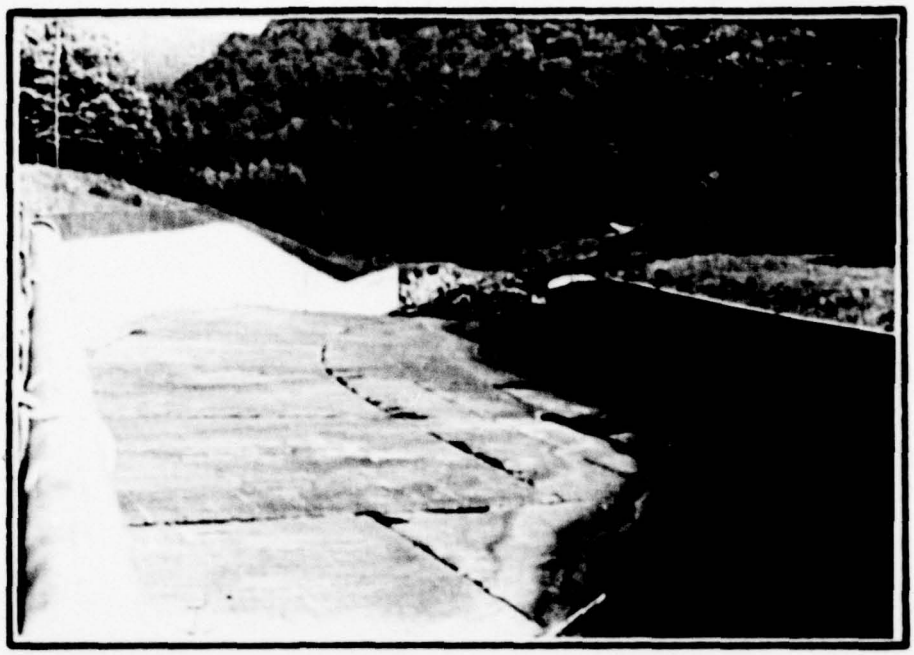
Discharge end of outlet works.

Seepage at end of rod adjacent to outlet works discharge.

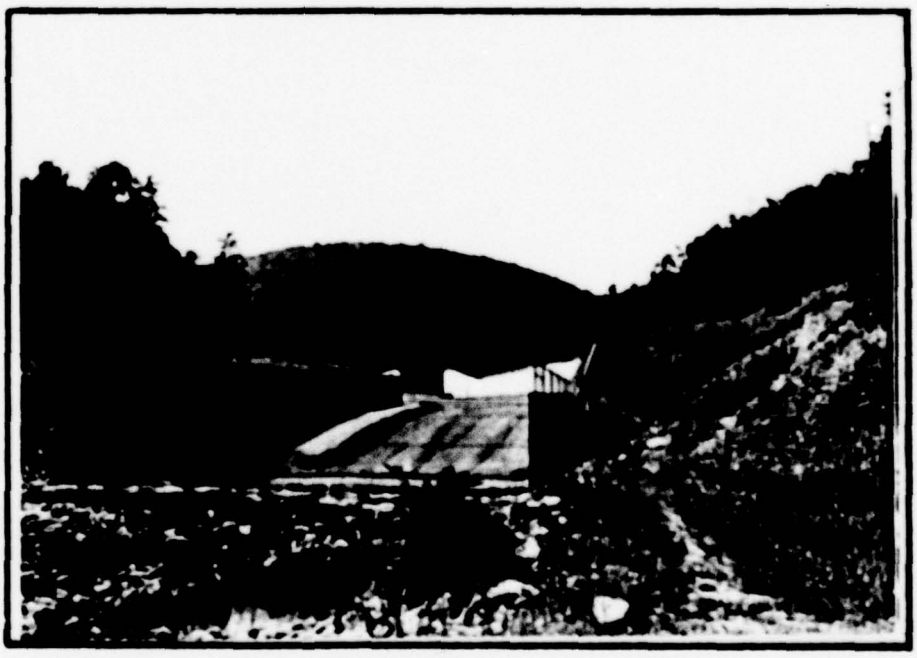
Large wet area beyond toe of dam.



Spillway weir.



Emergency spillway.



Emergency spillway and stilling basin.

APPENDIX D

HYDROLOGY AND HYDRAULICS

APPENDIX D
HYDROLOGY AND HYDRAULICS

Methodology. The dam overtopping and breach analyses were accomplished using the systemized computer program HEC-1 (Dam Safety Investigation), September, 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. A brief description of the methodology used in the analysis is presented below.

1. Precipitation. The Probable Maximum Precipitation (PMP) is derived and determined from regional charts prepared from past rainfall records including "Hydrometeorological Reports No. 40 prepared by the National Weather Service.

The index rainfall is reduced from 10% to 20% depending on watershed size by utilization of what is termed the HOP Brook adjustment factor. Distribution of the total rainfall is made by the computer program using distribution methods developed by the Corps.

2. Inflow Hydrograph. The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for reservoir routing.

The unit hydrograph is developed using the Snyder method. This method requires calculation of several key parameters. The following list gives these parameters their definition and how they were obtained for these analysis.

Parameter	Definition	Where Obtained
C_t	Coefficient representing variations of watershed slope and storage	From Corps of Engineers*
L	Length of main stream channel miles	From U.S.G.S. 7.5 minute topographic
L_{ca}	Length on main stream to centroid of watershed	From U.S.G.S. 7.5 minute topographic
C_p	Peaking coefficient	From Corps of Engineers*
A	Watershed size	From U.S.G.S. 7.5 minute topographic

*Developed by the Corps of Engineers on a regional basis for Pennsylvania.

3. Routing. Reservoir routing is accomplished by using Modified Plus routing techniques where the flood hydrograph is routed through reservoir storage. Hydraulic capacities of the outlet works, spillways and the crest of the dam are used as outlet controls in the routing.

The hydraulic capacity of the outlet works can either be calculated and input or sufficient dimensions input and the program will calculate an elevation discharge relationship.

Storage in the pool area is defined by an area - elevation relationship from which the computer calculates storage. Surface areas are either planimetered from available mapping or U.S.G.S. 7.5 minute series topographic maps or taken from reasonably accurate design data.

4. Dam Overtopping. Using given percentages of the PMF the computer program will calculate the percentage of the PMF which can be controlled by the reservoir and spillway without the dam overtopping.

5. Dam Breach and Downstream Routing. The computer program is equipped to determine the increase in downstream flooding due to failure of the dam caused by overtopping. This is accomplished by routing both the pre failure peak flow and the peak flow through the breach (calculated by the computer with given input assumptions) at a given point in time and determining the water depth in the downstream channel. Channel cross-sections taken from U.S.G.S. 7.5 minute topographic maps were used in the downstream flood wave routing. Pre and post failure water depths are calculated at locations where cross-sections are input.

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

DAM NAME LYMAN RUN DAM
I.D. NUMBER PA. 53-49
SHEET NO. 1 OF 2
BY OTM DATE 8-10-79

LYMAN RUN DAM

DRAINAGE AREA

AREA = 17.9 mi^2 (PL. DER. AND USGS 7.5-MIN. QUAD)

UNIT HYDROGRAPH PARAMETERS

DAMSITE LOCATED IN ZONE #17, SUSQUEHANNA RIVER BASIN. FROM CORPS OF ENGINEERS, BALTIMORE DISTRICT REGIONAL STUDY.

$C_p = 0.45$, $C_t = 1.13$

$L = 8.2$ mi , $L_{ca} = 3.2$ mi (FROM U.S.G.S. 7.5-MIN. QUAD)

$t_p = C_t (L \times L_{ca})^{0.3} = 1.13 (8.2 \times 3.2)^{0.3}$

$t_p = 3.0$ HRS (SNYDERS LAG (t_p) IN HRS.)

LOSS RATE AND BASE FLOW PARAMETERS

AS RECOMMENDED BY CORPS OF ENGINEERS, BALTIMORE DISTRICT.

STRTL = 1 INCH
CNSTL = 0.05 IN./HR.
STRTQ = 1.5 cfs/mi^2
QRCSN = 0.05 (5% OF PEAK FLOW)
RTIOR = 2.0

PROBABLE MAXIMUM STORM

FROM HR. NO. 40
PMP INDEX RAINFALL = 22.2 (1.01) = 22.4 IN.

$R_6 = 111\%$, $R_{12} = 121\%$, $R_{24} = 130$, $R_{48} = 137\%$, $R_{72} = 140\%$

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

DAM NAME LYMAN RUN DAM
I.D. NUMBER PA. 53-49
SHEET NO. 2 OF 2
BY OTM DATE 9-10-79

ELEVATION - AREA - CAPACITY RELATIONSHIP

FROM U.S.G.S. 7.5-MIN. QUADS, PA. DER. FILES AND FIELD INSPECTION DATA.

AT SPILLWAY CREST ELEV. 1635', AREA 40 ACRES
INITIAL STORAGE = 680 AC. FT

AT ELEV. 1660, AREA = 60 ACRES
AT ELEV. 1680, AREA = 94 ACRES

FROM CONIC METHOD FOR RESERVOIR VOLUME. FLOOD HYDROGRAPH PACKAGE (HEC-1), DAM SAFETY VERSION (USERS MANUAL).

$H = 3V/A = 3(680)/40 = 51'$
ELEV. AT CAPACITY EQUALS ZERO;
$1635' - 51' = 1584$

AREA (AC)	0	40	50	60	78	94
ELEV (FT)	1584	1635	1648	1660	1672	1680

SPILLWAY DISCHARGE

DETERMINED BY (HEC-1)
SPILLWAY CREST = 1635'
SPILLWAY LENGTH = 125'
COEFFICIENT OF DISCHARGE (C) = 3.5 (OGEE)

OVERTOP PARAMETERS

TOP OF DAM (LOW SPOT) = 1651.2
LENGTH OF DAM = 920'
COEFFICIENT OF DISCHARGE (C) = 3.0 (BROAD CREST)

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 17.9 square miles, woodland, steep slopes

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1635.0 (680 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N/A

ELEVATION MAXIMUM DESIGN POOL: 1652.5

ELEVATION TOP DAM: 1651.2

SPILLWAY CREST:

a. Elevation 1635.0
b. Type Concrete ogee weir
c. Width -
d. Length 125 feet
e. Location Spillover Left abutment
f. Number and Type of Gates None.

OUTLET WORKS:

a. Type 5' x 5' concrete box culvert
b. Location Through dam
c. Entrance inverts 1600.2
d. Exit inverts 1599.8
e. Emergency draindown facilities Sluice gate on control tower.

HYDROMETEOROLOGICAL GAUGES:

a. Type None.
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE: Unknown.

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
 LAST MODIFICATION  26 FEB 79
**********
    1          A1       ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF
    2          A2       HYDROLOGIC-HYDRAULIC ANALYSIS OF DAM SAFETY OF LYMAN RUN DAM
    3          A3       RATIOS OF PMF ROUTED THROUGH THE RESERVOIR (PA. 53-491)
    4          B    288       0      15       0       0       0       0       0       0       0
    5          B1     5
    6          J     1       4       1
    7          J1   .2      .3      .4       1
    8          K     0       1                                                       1
    9          K1       INFLOW TO RESERVOIR
   10          M     1       1    17.9            17.9                                       1
   11          P            22.4     111     121     130     137     140
   12          T                                                    1.0    0.05
   13          W   3.0    0.45
   14          X  .168    .005     2.0
   15          X     1       2                                                       1
   16          X1       ROUTE THROUGH RESERVOIR
   17          Y                                       1       1
   18          Y1    1                                                        -1635
   19          SA    0      40      50      60      78      94
   20          S1 1566    1635    1648    1660    1672    1680
   21          S2 1639     129     3.5     1.5
   22          S3 1691.2   3.0     1.5     920
   23          K    99
```

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE  79/08/13.
     TIME  10.59.34.
```

ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF
HYDROLOGIC-HYDRAULIC ANALYSIS OF DAM SAFETY OF LYMAN RUN DAM
RATIOS OF PMF ROUTED THROUGH THE RESERVOIR (PA. 33-69)

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
288	0	15	0	0	0	0	0	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 4 LRTIO= 1

RTIOS= .20 .30 .40 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW TO RESERVOIR

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDO	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	17.90	0.00	17.90	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.60	111.00	121.00	130.00	137.00	140.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .820

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

IP= 3.00 CP= .45 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC=12.50 AND R=19.13 INTERVALS

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 3.02 HOURS, CP= .45 VOL= .99

38.	142.	293.	472.	673.	891.	1116.	1322.	1494.	1628.
1723.	1771.	1750.	1674.	1589.	1508.	1431.	1358.	1289.	1223.
1161.	1102.	1046.	993.	942.	894.	848.	805.	764.	725.
688.	653.	620.	588.	558.	530.	503.	477.	453.	430.
408.	387.	368.	349.	331.	314.	298.	283.	269.	255.
242.	230.	218.	207.	196.	186.	177.	168.	159.	151.
143.	136.	129.	123.	116.	110.	105.	99.	94.	90.
85.	81.	77.	73.	69.	65.	62.	59.	56.	53.
50.	48.	45.	43.	41.	39.	37.	35.	33.	32.
30.	28.	27.	26.	24.	23.	22.	21.	20.	19.

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.15	1	.00	0.00	.00	25.	1.02	12.15	145	.51	.50	.01	2046.
1.01	.30	2	.00	0.00	.00	23.	1.02	12.30	146	.51	.50	.01	21596.

1.01	.45	3	.00	0.00	.00	22.	1.02	12.45	147	.51	.50	.01	2326.
1.01	1.00	4	.00	0.00	.00	20.	1.02	13.00	148	.51	.50	.01	2573.
1.01	1.15	5	.00	0.00	.00	19.	1.02	13.15	149	.61	.60	.01	2909.
1.01	1.30	6	.00	0.00	.00	18.	1.02	13.30	150	.61	.60	.01	3347.
1.01	1.45	7	.00	0.00	.00	17.	1.02	13.45	151	.61	.60	.01	3897.
1.01	2.00	8	.00	0.00	.00	15.	1.02	14.00	152	.61	.60	.01	4552.
1.01	2.15	9	.00	0.00	.00	14.	1.02	14.15	153	.76	.75	.01	5306.
1.01	2.30	10	.00	0.00	.00	13.	1.02	14.30	154	.76	.75	.01	6154.
1.01	2.45	11	.00	0.00	.00	13.	1.02	14.45	155	.76	.75	.01	7088.
1.01	3.00	12	.00	0.00	.00	12.	1.02	15.00	156	.76	.75	.01	8090.
1.01	3.15	13	.00	0.00	.00	11.	1.02	15.15	157	.77	.76	.01	9129.
1.01	3.30	14	.00	0.00	.00	10.	1.02	15.30	158	1.53	1.51	.01	10212.
1.01	3.45	15	.00	0.00	.00	9.	1.02	15.45	159	1.36	1.32	.01	11488.
1.01	4.00	16	.00	0.00	.00	9.	1.02	16.00	160	1.08	1.07	.01	13051.
1.01	4.15	17	.00	0.00	.00	8.	1.02	16.15	161	.71	.70	.01	14811.
1.01	4.30	18	.00	0.00	.00	8.	1.02	16.30	162	.71	.70	.01	16682.
1.01	4.45	19	.00	0.00	.00	7.	1.02	16.45	163	.71	.70	.01	18618.
1.01	5.00	20	.00	0.00	.00	7.	1.02	17.00	164	.71	.70	.01	20587.
1.01	5.15	21	.00	0.00	.00	6.	1.02	17.15	165	.96	.95	.01	22915.
1.01	5.30	22	.00	0.00	.00	6.	1.02	17.30	166	.96	.95	.01	24283.
1.01	5.45	23	.00	0.00	.00	5.	1.02	17.45	167	.96	.95	.01	25809.
1.01	6.00	24	.00	0.00	.00	5.	1.02	18.00	168	.96	.95	.01	27078.
1.01	6.15	25	.00	0.00	.00	5.	1.02	18.15	169	.04	.03	.01	28056.
1.01	6.30	26	.00	0.00	.00	4.	1.02	18.30	170	.04	.03	.01	28667.
1.01	6.45	27	.00	0.00	.00	4.	1.02	18.45	171	.04	.03	.01	28821.
1.01	7.00	28	.00	0.00	.00	4.	1.02	19.00	172	.04	.03	.01	28587.
1.01	7.15	29	.00	0.00	.00	4.	1.02	19.15	173	.04	.03	.01	28143.
1.01	7.30	30	.00	0.00	.00	3.	1.02	19.30	174	.04	.03	.01	27553.
1.01	7.45	31	.00	0.00	.00	3.	1.02	19.45	175	.04	.03	.01	26827.
1.01	8.00	32	.00	0.00	.00	3.	1.02	20.00	176	.04	.03	.01	25979.
1.01	8.15	33	.00	0.00	.00	3.	1.02	20.15	177	.04	.03	.01	25041.
1.01	8.30	34	.00	0.00	.00	3.	1.02	20.30	178	.04	.03	.01	24038.
1.01	8.45	35	.00	0.00	.00	2.	1.02	20.45	179	.04	.03	.01	22995.
1.01	9.00	36	.00	0.00	.00	2.	1.02	21.00	180	.04	.03	.01	21935.
1.01	9.15	37	.00	0.00	.00	2.	1.02	21.15	181	.04	.03	.01	20892.
1.01	9.30	38	.00	0.00	.00	2.	1.02	21.30	182	.04	.03	.01	19896.

1.01	9.45	39	.00	0.00	.00	2.	1.02	21.45	183	.04	.03	.01	18950.
1.01	10.00	40	.00	0.00	.00	2.	1.02	22.00	184	.04	.03	.01	18059.
1.01	10.15	41	.00	0.00	.00	2.	1.02	22.15	185	.04	.03	.01	17201.
1.01	10.30	42	.00	0.00	.00	1.	1.02	22.30	186	.04	.03	.01	16393.
1.01	10.45	43	.00	0.00	.00	1.	1.02	22.45	187	.04	.03	.01	15626.
1.01	11.00	44	.00	0.00	.00	1.	1.02	23.00	188	.04	.03	.01	14897.
1.01	11.15	45	.00	0.00	.00	1.	1.02	23.15	189	.04	.03	.01	14206.
1.01	11.30	46	.00	0.00	.00	1.	1.02	23.30	190	.04	.03	.01	13551.
1.01	11.45	47	.00	0.00	.00	1.	1.02	23.45	191	.04	.03	.01	12928.
1.01	12.00	48	.00	0.00	.00	1.	1.03	0.00	192	.04	.03	.01	12338.
1.01	12.15	49	.03	0.00	.03	1.	1.03	.15	193	.00	0.00	.00	11776.
1.01	12.30	50	.03	0.00	.03	1.	1.03	.30	194	.00	0.00	.00	11240.
1.01	12.45	51	.03	0.00	.03	1.	1.03	.45	195	.00	0.00	.00	10726.
1.01	13.00	52	.03	0.00	.03	1.	1.03	1.00	196	.00	0.00	.00	10233.
1.01	13.15	53	.03	0.00	.03	1.	1.03	1.15	197	.00	0.00	.00	9759.
1.01	13.30	54	.03	0.00	.03	1.	1.03	1.30	198	.00	0.00	.00	9301.
1.01	13.45	55	.03	0.00	.03	1.	1.03	1.45	199	.00	0.00	.00	8859.
1.01	14.00	56	.03	0.00	.03	1.	1.03	2.00	200	.00	0.00	.00	8432.
1.01	14.15	57	.04	0.00	.04	1.	1.03	2.15	201	.00	0.00	.00	8020.
1.01	14.30	58	.04	0.00	.04	0.	1.03	2.30	202	.00	0.00	.00	7622.
1.01	14.45	59	.04	0.00	.04	0.	1.03	2.45	203	.00	0.00	.00	7240.
1.01	15.00	60	.04	0.00	.04	0.	1.03	3.00	204	.00	0.00	.00	6874.
1.01	15.15	61	.04	0.00	.04	0.	1.03	3.15	205	.00	0.00	.00	6524.
1.01	15.30	62	.08	0.00	.08	0.	1.03	3.30	206	.00	0.00	.00	6191.
1.01	15.45	63	.23	0.00	.23	0.	1.03	3.45	207	.00	0.00	.00	5876.
1.01	16.00	64	.06	0.00	.06	0.	1.03	4.00	208	.00	0.00	.00	5576.
1.01	16.15	65	.04	0.00	.04	0.	1.03	4.15	209	.00	0.00	.00	5292.
1.01	16.30	66	.04	.02	.02	1.	1.03	4.30	210	.00	0.00	.00	5022.
1.01	16.45	67	.04	.03	.01	5.	1.03	4.45	211	.00	0.00	.00	4766.
1.01	17.00	68	.04	.03	.01	12.	1.03	5.00	212	.00	0.00	.00	4523.
1.01	17.15	69	.03	.02	.01	23.	1.03	5.15	213	.00	0.00	.00	4292.
1.01	17.30	70	.03	.02	.01	39.	1.03	5.30	214	.00	0.00	.00	4073.
1.01	17.45	71	.03	.02	.01	59.	1.03	5.45	215	.00	0.00	.00	3866.
1.01	18.00	72	.03	.02	.01	83.	1.03	6.00	216	.00	0.00	.00	3668.
1.01	18.15	73	.00	0.00	.00	111.	1.03	6.15	217	.00	0.00	.00	3481.
1.01	18.30	74	.00	0.00	.00	139.	1.03	6.30	218	.00	0.00	.00	3304.

1.01	18.45	75	.00	0.00	.00	186.	1.03	6.45	219	.00	0.00	.00	3133.
1.01	19.00	76	.00	0.00	.00	192.	1.03	7.00	220	.00	0.00	.00	2978.
1.01	19.15	77	.00	0.00	.00	213.	1.03	7.15	221	.00	0.00	.00	2823.
1.01	19.30	78	.00	0.00	.00	229.	1.03	7.30	222	.00	0.00	.00	2678.
1.01	19.45	79	.00	0.00	.00	239.	1.03	7.45	223	.00	0.00	.00	2540.
1.01	20.00	80	.00	0.00	.00	242.	1.03	8.00	224	.00	0.00	.00	2410.
1.01	20.15	81	.00	0.00	.00	241.	1.03	8.15	225	.00	0.00	.00	2286.
1.01	20.30	82	.00	0.00	.00	236.	1.03	8.30	226	.00	0.00	.00	2168.
1.01	20.45	83	.00	0.00	.00	227.	1.03	8.45	227	.00	0.00	.00	2057.
1.01	21.00	84	.00	0.00	.00	217.	1.03	9.00	228	.00	0.00	.00	1951.
1.01	21.15	85	.00	0.00	.00	206.	1.03	9.15	229	.00	0.00	.00	1850.
1.01	21.30	86	.00	0.00	.00	196.	1.03	9.30	230	.00	0.00	.00	1753.
1.01	21.45	87	.00	0.00	.00	186.	1.03	9.45	231	.00	0.00	.00	1664.
1.01	22.00	88	.00	0.00	.00	177.	1.03	10.00	232	.00	0.00	.00	1579.
1.01	22.15	89	.00	0.00	.00	168.	1.03	10.15	232	.00	0.00	.00	1497.
1.01	22.30	90	.00	0.00	.00	159.	1.03	10.30	234	.00	0.00	.00	1420.
1.01	22.45	91	.00	0.00	.00	151.	1.03	10.45	235	.00	0.00	.00	1346.
1.01	23.00	92	.00	0.00	.00	143.	1.03	11.00	236	.00	0.00	.00	1276.
1.01	23.15	93	.00	0.00	.00	136.	1.03	11.15	237	.00	0.00	.00	1210.
1.01	23.30	94	.00	0.00	.00	129.	1.03	11.30	238	.00	0.00	.00	1148.
1.01	23.45	95	.00	0.00	.00	122.	1.03	11.45	239	.00	0.00	.00	1088.
1.02	0.00	96	.00	0.00	.00	116.	1.03	12.00	240	.00	0.00	.00	1031.
1.02	.15	97	.03	.02	.01	111.	1.03	12.15	241	.01	0.00	.01	978.
1.02	.30	98	.03	.02	.01	107.	1.03	12.30	242	.01	0.00	.01	927.
1.02	.45	99	.03	.02	.01	106.	1.03	12.45	243	.01	0.00	.01	878.
1.02	1.00	100	.03	.02	.01	108.	1.03	13.00	246	.01	.00	.01	833.
1.02	1.15	101	.03	.02	.01	114.	1.03	13.15	245	.01	.00	.01	781.
1.02	1.30	102	.08	.02	.01	123.	1.03	13.30	246	.01	.00	.01	733.
1.02	1.45	103	.03	.02	.01	135.	1.03	13.45	247	.01	.00	.01	687.
1.02	2.00	104	.03	.02	.01	151.	1.03	14.00	248	.01	.00	.01	644.
1.02	2.15	105	.03	.02	.01	169.	1.03	14.15	249	.01	.01	.01	602.
1.02	2.30	106	.03	.02	.01	190.	1.03	14.30	250	.02	.01	.01	563.
1.02	2.45	107	.03	.02	.01	213.	1.03	14.45	251	.02	.01	.01	527.
1.02	3.00	108	.03	.02	.01	236.	1.03	15.00	252	.02	.01	.01	494.
1.02	3.15	109	.03	.02	.01	259.	1.03	15.15	253	.02	.01	.01	460.
1.02	3.30	110	.03	.02	.01	281.	1.03	15.30	254	.02	.02	.01	431.

1.02	3.45	111	.03	.02	.01	302.	1.01	15.45	255	.10	.09	.01	409.
1.02	4.00	112	.03	.02	.01	322.	1.01	16.00	256	.03	.01	.01	398.
1.02	4.15	113	.03	.02	.01	341.	1.01	16.15	257	.02	.00	.01	389.
1.02	4.30	114	.03	.02	.01	359.	1.03	16.30	258	.02	.00	.01	374.
1.02	4.45	115	.03	.02	.01	376.	1.03	16.45	259	.02	.00	.01	349.
1.02	5.00	116	.03	.02	.01	393.	1.03	17.00	260	.02	.00	.01	325.
1.02	5.15	117	.03	.02	.01	408.	1.03	17.15	261	.01	.00	.01	329.
1.02	5.30	118	.03	.02	.01	422.	1.03	17.30	262	.01	.00	.01	338.
1.02	5.45	119	.03	.02	.01	436.	1.03	17.45	263	.01	.00	.01	343.
1.02	6.00	120	.03	.02	.01	449.	1.03	18.00	264	.01	.00	.01	344.
1.02	6.15	121	.08	.06	.01	464.	1.03	18.15	265	.00	0.00	.00	343.
1.02	6.30	122	.08	.06	.01	483.	1.03	18.30	266	.00	0.00	.00	336.
1.02	6.45	123	.08	.06	.01	504.	1.03	18.45	267	.00	0.00	.00	321.
1.02	7.00	124	.08	.06	.01	542.	1.03	19.00	268	.00	0.00	.00	301.
1.02	7.15	125	.08	.06	.01	585.	1.03	19.15	269	.00	0.00	.00	288.
1.02	7.30	126	.08	.06	.01	638.	1.03	19.30	270	.00	0.00	.00	275.
1.02	7.45	127	.08	.06	.01	702.	1.03	19.45	271	.00	0.00	.00	261.
1.02	8.00	128	.08	.06	.01	779.	1.03	20.00	272	.00	0.00	.00	248.
1.02	8.15	129	.08	.06	.01	857.	1.03	20.15	273	.00	0.00	.00	235.
1.02	8.30	130	.08	.06	.01	944.	1.03	20.30	274	.00	0.00	.00	223.
1.02	8.45	131	.08	.06	.01	1036.	1.03	20.45	275	.00	0.00	.00	211.
1.02	9.00	132	.08	.06	.01	1130.	1.03	21.00	276	.00	0.00	.00	200.
1.02	9.15	133	.08	.06	.01	1222.	1.03	21.15	277	.00	0.00	.00	189.
1.02	9.30	134	.08	.06	.01	1310.	1.03	21.30	278	.00	0.00	.00	179.
1.02	9.45	135	.08	.06	.01	1396.	1.03	21.45	279	.00	0.00	.00	170.
1.02	10.00	136	.08	.06	.01	1476.	1.03	22.00	280	.00	0.00	.00	160.
1.02	10.15	137	.08	.06	.01	1549.	1.03	22.15	281	.00	0.00	.00	152.
1.02	10.30	138	.08	.06	.01	1621.	1.03	22.30	282	.00	0.00	.00	144.
1.02	10.45	139	.08	.06	.01	1689.	1.03	22.45	283	.00	0.00	.00	136.
1.02	11.00	140	.08	.06	.01	1753.	1.03	23.00	284	.00	0.00	.00	128.
1.02	11.15	141	.08	.06	.01	1814.	1.03	23.15	285	.00	0.00	.00	121.
1.02	11.30	142	.08	.06	.01	1873.	1.03	23.30	286	.00	0.00	.00	115.
1.02	11.45	143	.08	.06	.01	1928.	1.03	23.45	287	.00	0.00	.00	108.
1.02	12.00	144	.08	.06	.01	1980.	1.04	0.00	288	.00	0.00	.00	102.
									SUM	28.70	22.98	2.72	.1052096.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	28821.	23628.	10405.	3653.	1052036.
CMS	816.	669.	295.	103.	29790.
INCHES		12.38	21.69	22.78	22.78
MM		311.68	549.87	578.62	578.62
AC-FT		11716.	20638.	21736.	21736.
THOUS CU M		14452.	25456.	26811.	26811.

HYDROGRAPH AT STA 1 FOR PLAN 1(RTIO 1)

3.	2.	2.	2.	2.	2.	2.	2.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
12.	17.	22.	28.	33.	38.	43.	48.	49.	48.
48.	47.	45.	43.	41.	39.	37.	35.	34.	32.
30.	29.	27.	26.	24.	23.	22.	21.	21.	22.
207.	226.	244.	262.	279.	295.	310.	324.	338.	351.
363.	375.	386.	396.	409.	431.	465.	515.	582.	669.
779.	910.	1061.	1231.	1418.	1618.	1826.	2042.	2298.	2610.
2586.	2468.	2355.	2248.	2145.	2047.	1952.	1860.	1772.	1686.
1604.	1524.	1448.	1375.	1305.	1238.	1175.	1115.	1058.	1004.
953.	905.	858.	815.	773.	734.	696.	661.	627.	595.

D-13

ROUTE THROUGH RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

LOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1635.	0

SURFACE AREA	0.	60.	90.	60.	78.	94.
CAPACITY	0.	680.	1764.	1923.	2769.	3636.
ELEVATION	1584.	1635.	1648.	1660.	1672.	1680.

CREL	SPWID	COOD	EXPD	ELEVL	COOL	CAREA	EXPF
1635.0	129.0	3.3	1.0	0.0	0.0	0.0	1.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
1697.72	3.0	1.5	9200.

STATION 80 PLAN 11 RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

ROUTFLOW

0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.

N/S

1635.9	1635.9	1635.9	1635.6	1635.6	1635.6	1635.6	1635.7	1635.7	1635.7
1635.8	1635.9	1635.9	1636.0	1636.0	1636.1	1636.1	1636.2	1636.2	1636.3
1636.3	1636.3	1636.4	1636.4	1636.4	1636.5	1636.5	1636.6	1636.7	1636.8
1637.0	1637.2	1637.4	1637.7	1637.9	1638.3	1638.6	1638.9	1639.3	1639.6
1640.1	1640.5	1641.0	1641.5	1641.9	1642.4	1642.8	1643.1	1643.4	1643.6
1643.8	1643.8	1643.8	1643.7	1643.6	1643.4	1643.3	[illegible]	1642.9	1642.7
1642.4	1642.2	1642.0	1641.8	1641.5	1641.3	1641.1	1641.0	[illegible]	1640.6
1640.4	1640.3	1640.1	1639.9	1639.8	1639.7	1639.5	1639.4	1639.2	1639.1
1639.0	1638.9	1638.7	1638.6	1638.5	1638.4	1638.3	1638.2	1638.0	1637.9
1637.8	1637.8	1637.7	1637.6	1637.5	1637.4	1637.3	1637.2	1637.2	1637.1
1637.0	1637.0	1636.9	1636.8	1636.8	1636.7	1636.7	1636.6	1636.6	1636.5
[illegible]	[illegible]	1636.4	1636.3	1636.3	1636.2	1636.2	[illegible]	[illegible]	1636.1
1636.0	1636.0	1636.0	1635.9	1635.9	1635.9	1635.8	[illegible]	1635.8	1635.7
[illegible]	[illegible]	1635.7	1635.6	1635.6	1635.6	1635.6	[illegible]	1635.6	1635.5
1635.5	1635.5	1635.5	1635.5	1635.5	1635.5	1635.5	1635.5	1635.5	1635.4
1635.4	1635.4	1635.4	1635.4	1635.4	1635.4	1635.4	1635.4	1635.3	1635.3
1635.3	1635.3	1635.3	1635.3	1635.3	1635.3	1635.3	1635.3		

PEAK OUTFLOW IS [illegible] AT TIME 43.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	11420.	9410.	4159.	1459.	420327.
CMS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
INCHES		[illegible]	[illegible]	[illegible]	[illegible]
MM		[illegible]	[illegible]	[illegible]	[illegible]
AC-FT		4666.	8250.	8684.	8684.
THOUS CU M		5755.	10176.	10712.	10712.

STATION 2, PLAN 1, RATIO 6

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1/15

1.	2.	3.	4.	5.	6.	7.	8.	8.	9.
9.	9.	10.	10.	10.	10.	10.	[illegible]	9.	9.
9.	9.	8.	8.	8.	8.	7.	7.	7.	6.
6.	6.	6.	5.	5.	5.	5.	5.	4.	4.
4.	4.	4.	4.	3.	3.	3.	3.	3.	3.
3.	3.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	3.	1.	1.	2.	2.	[illegible]	[illegible]
0.	16.	23.	36.	53.	73.	96.	120.	143.	164.
181.	194.	202.	207.	208.	206.	203.	198.	192.	186.
179.	172.	165.	158.	151.	144.	138.	132.	127.	123.
121.	120.	122.	126.	133.	143.	155.	170.	187.	206.
[illegible]	257.	268.	281.	309.	328.	347.	[illegible]	385.	400.
[illegible]	432.	450.	472.	499.	532.	574.	625.	686.	756.
834.	920.	1010.	1102.	1194.	1284.	1371.	1456.	1533.	1600.
1679.	1746.	1809.	1869.	1929.	2001.	2103.	2252.	2467.	2764.
3161.	3668.	4290.	5024.	5864.	6799.	7807.	8870.	10025.	11362.
12925.	14677.	16557.	18515.	20496.	22413.	24170.	25700.	26965.	27915.
[illegible]	[illegible]	[illegible]	[illegible]	27460.	26742.	25900.	[illegible]	[illegible]	22974.
[illegible]	[illegible]	19037.	19001.	18110.	17265.	16462.	[illegible]	[illegible]	14288.
[illegible]	13017.	12428.	11868.	11334.	10822.	10331.	9851.	[illegible]	8963.
8539.	8130.	7735.	7355.	6991.	6643.	6311.	5996.	5696.	5411.
5141.	4884.	4640.	4408.	4189.	3980.	3781.	3593.	3414.	3244.
3082.	2928.	2782.	2643.	2511.	2385.	2266.	2153.	2045.	1943.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1165.
[illegible]	1050.	997.	947.	898.	850.	803.	757.	713.	671.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	389.
372.	361.	356.	353.	350.	347.	342.	336.	324.	313.
301.	289.	277.	265.	253.	242.	231.	220.	209.	199.
189.	180.	171.	163.	155.	147.	139.	132.		
				STORAGE					
681.	681.	681.	682.	682.	682.	683.	683.	683.	683.
683.	683.	683.	683.	683.	683.	683.	683.	683.	683.
683.	683.	683.	683.	683.	683.	683.	683.	683.	682.
682.	682.	682.	682.	682.	682.	682.	682.	682.	682.
682.	682.	682.	682.	682.	682.	681.	681.	681.	681.

12/15

681.	681.	681.	681.	681.	681.	681.	681.	681.	681.
681.	681.	681.	681.	681.	681.	681.	681.	681.	682.
683.	684.	686.	688.	690.	692.	695.	697.	699.	701.
702.	703.	704.	704.	705.	704.	704.	704.	703.	703.
702.	702.	701.	700.	700.	699.	699.	698.	698.	697.
697.	697.	697.	698.	698.	699.	700.	701.	703.	704.
706.	707.	709.	710.	712.	713.	715.	716.	717.	718.
719.	720.	721.	722.	724.	726.	728.	731.	735.	738.
742.	747.	751.	755.	760.	764.	767.	771.	774.	777.
780.	783.	785.	788.	790.	793.	797.	803.	810.	821.
835.	851.	871.	893.	917.	943.	970.	998.	1027.	1059.
[illegible]	1137.	1179.	1221.	1264.	1304.	1340.	1371.	1397.	1416.
[illegible]	1430.	1426.	1410.	1407.	1392.	1375.	[illegible]	1336.	1315.
[illegible]	1272.	1252.	1232.	1213.	1194.	1176.	1160.	1143.	1120.
1113.	1099.	1085.	1072.	1059.	1046.	1034.	1023.	1011.	1000.
989.	979.	969.	958.	949.	939.	930.	921.	913.	904.
897.	889.	882.	875.	868.	861.	855.	849.	843.	837.
[illegible]	827.	822.	817.	812.	807.	803.	[illegible]	[illegible]	791.
787.	783.	780.	776.	773.	770.	767.	764.	763.	758.
753.	753.	750.	746.	746.	743.	741.	738.	736.	734.
732.	730.	728.	726.	724.	722.	721.	720.	719.	717.
716.	715.	715.	715.	715.	715.	714.	714.	713.	712.
711.	711.	710.	709.	708.	707.	706.	705.	703.	704.
[illegible]	702.	701.	701.	700.	698.	697.	[illegible]		

STAGE

1635.0	1635.0	1635.0	1635.0	1635.1	1635.1	1635.1	1635.1	1635.1	1635.1
1635.1	1635.1	1635.1	1635.1	1635.1	1635.1	1635.1	1635.1	1635.1	1635.1
1635.1	1635.1	1635.1	1635.1	1635.1	1635.1	1635.1	1635.1	1635.1	1635.1
[illegible]	[illegible]	1635.1	[illegible]	[illegible]	[illegible]	1635.0	[illegible]	1635.0	1635.0
1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0
1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0
1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0	1635.0
1635.1	1635.1	1635.1	1635.2	1635.2	1635.3	1635.4	1635.4	1635.5	1635.5
1635.6	1635.6	1635.6	1635.6	1635.6	1635.6	1635.6	1635.6	1635.6	1635.6
[illegible]	1635.5	1635.5	1635.5	[illegible]	1635.5	[illegible]	[illegible]	1635.4	1635.6

1635.4	1635.4	1635.4	1635.4	1635.9	1635.9	1635.9	1635.9	1635.6	1635.6
1635.6	1635.7	1635.7	1635.8	1635.8	1635.8	1635.9	1636.0	1635.9	1635.9
1636.0	1636.0	1636.0	1636.1	1636.1	1636.1	1636.2	1636.3	1636.3	1636.4
1636.5	1636.6	1636.7	1636.9	1637.0	1637.1	1637.1	1637.2	1637.3	1637.4
1637.5	1637.5	1637.6	1637.6	1637.7	1637.8	1637.8	1638.0	1638.2	1638.4
1638.7	1639.1	1639.6	1640.1	1640.6	1641.2	1641.8	1642.6	1643.1	1643.8
1644.6	1645.4	1646.3	1647.1	1648.0	1648.8	1649.5	1650.1	1650.6	1651.0
1651.2	1651.2	1651.2	1651.0	1650.8	1650.5	1650.2	1649.8	1649.5	1649.0
1648.6	1648.2	1647.8	1647.4	1647.0	1646.6	1646.2	1645.9	1645.5	1645.2
1644.9	1644.6	1644.3	1644.0	1643.8	1643.5	1643.2	1643.0	1642.7	1642.5
1642.2	1642.0	1641.8	1641.6	1641.3	1641.1	1640.9	1640.7	1640.5	1640.3
1640.2	1640.0	1639.8	1639.7	1639.5	1639.4	1639.2	1639.1	1638.9	1638.8
1638.7	1638.6	1638.4	1638.3	1638.2	1638.1	1638.0	1637.9	1637.8	1637.7
1637.6	1637.5	1637.4	1637.4	1637.3	1637.2	1637.1	1637.1	1637.0	1636.9
1636.9	1636.8	1636.7	1636.7	1636.6	1636.6	1636.5	1636.4	1636.4	1636.3
1636.3	1636.2	1636.2	1636.1	1636.1	1636.0	1636.0	1636.0	1636.0	1635.9
1635.9	1635.9	1635.9	1635.9	1635.9	1635.9	1635.8	1635.8	1635.8	1635.8
1635.8	1635.8	1635.7	1635.7	1635.7	1635.7	1635.7	1635.6	1635.6	1635.6
1635.6	1635.6	1635.6	1635.6	1635.5	1635.5	1635.5	1635.5		

PEAK OUTFLOW IS 20647. AT TIME 63.00 HOURS

D-18

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	20647.	23683.	10401.	3690.	1091[illegible]
CMS	5[illegible]	667.	294.	103.	29764.
INCHES		12.25	21.62	22.76	22.76
MM		311.04	549.19	578.15	578.15
AC-FT		11684.	20631.	21719.	21719.
THOUS CU M		14[illegible]	25[illegible]	26[illegible]	26[illegible]

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .20	RATIO 2 .30	RATIO 3 .40	RATIO 4 1.00
HYDROGRAPH AT	1	17.90 (46.361	1	5769. (163.321(	8646. (244.831(	11528. (326.451(	28821. (816.111(
ROUTED TO	2	17.90 (46.361	1	5684. (160.941(	8551. (242.151(	11420. (323.381(	28647. (811.181(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1635.00	1635.00	1651.20
STORAGE	680.	680.	1428.
OUTFLOW	0.	0.	[illegible]

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	1640.58	0.00	912.	3686.	0.00	93.00	0.00
.30	1642.26	0.00	990.	6551.	0.00	93.00	0.00
.40	1643.80	0.00	1061.	11420.	0.00	93.00	0.00
1.00	1651.24	.04	1430.	28647.	.25	93.00	0.00

D-20

APPENDIX E

DRAWINGS

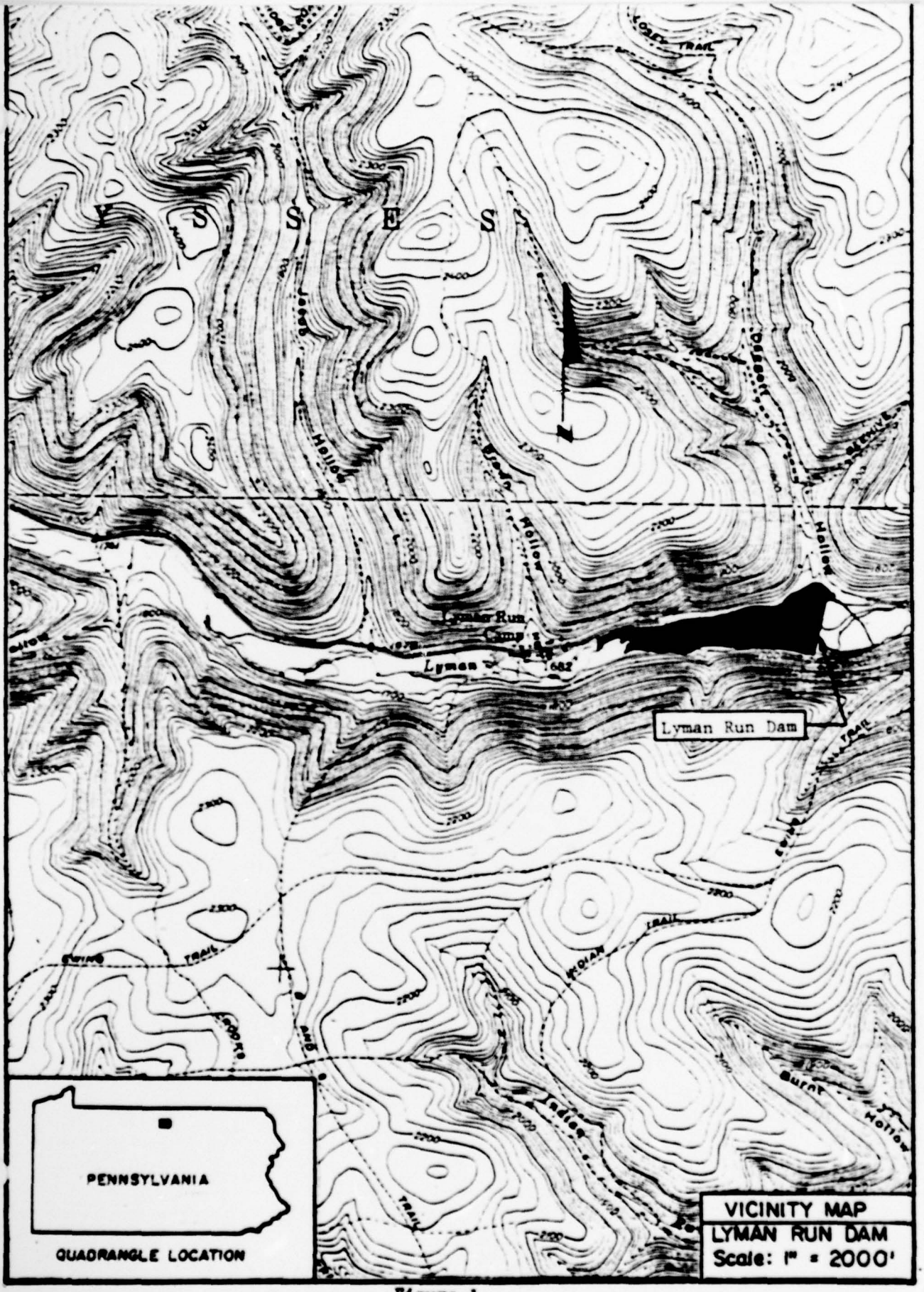
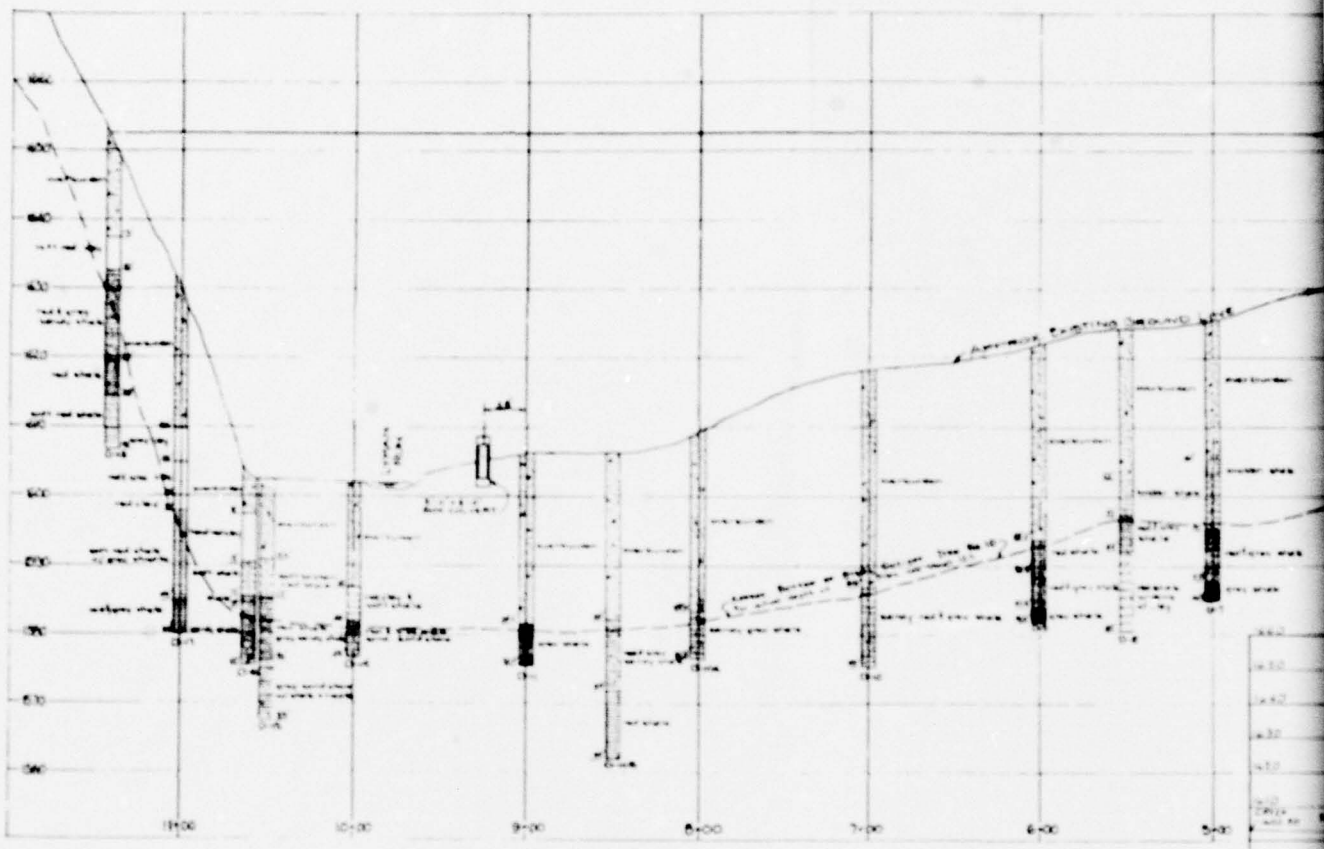
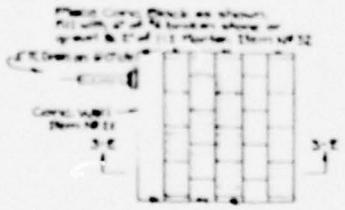

Lyman Run Dam
PENNSYLVANIA
QUADRANGLE LOCATION
VICINITY MAP
LYMAN RUN DAM
Scale: 1" = 2000'

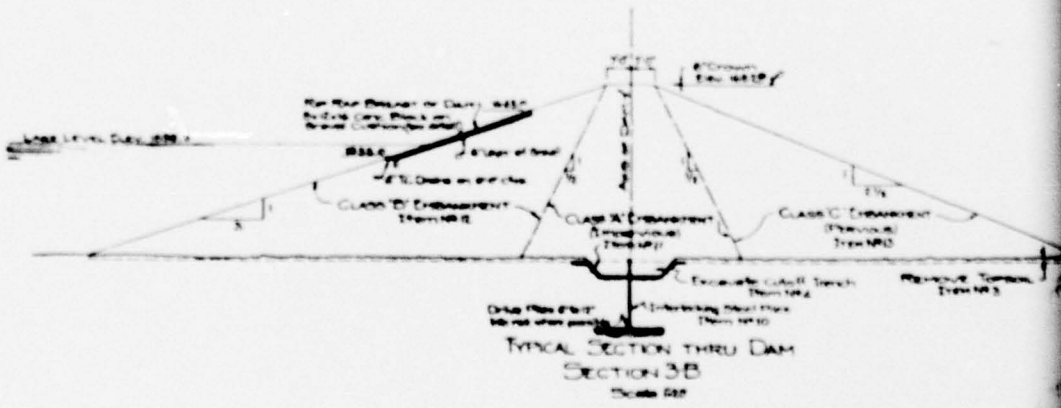
Figure 1



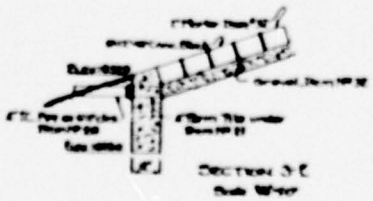
3-A
Profile on Axis of Dam



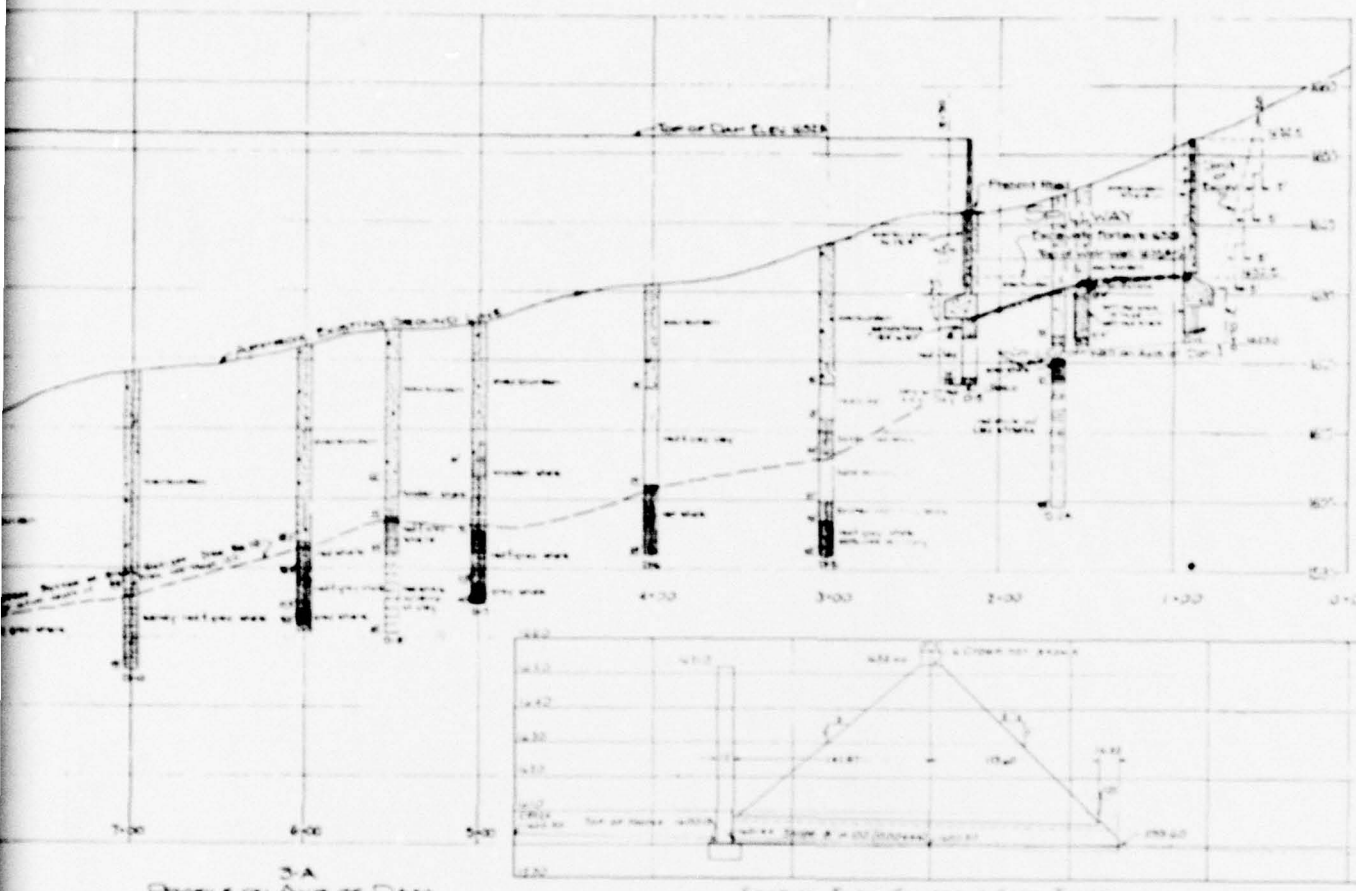
Detail 3-D
Flume Upstream Breast of Dam



Typical Section thru Dam
Section 3-B

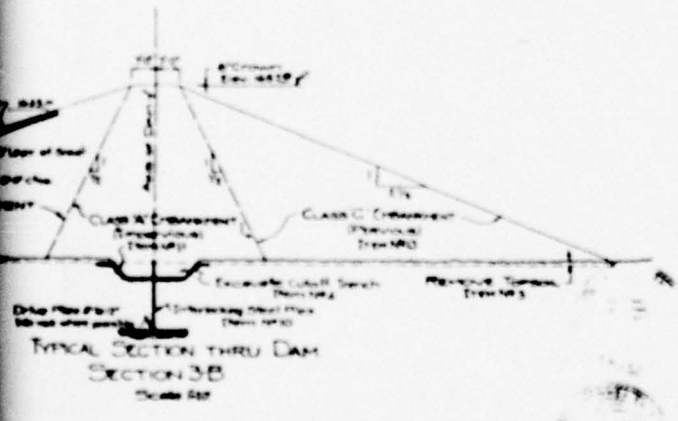


Section 3-E

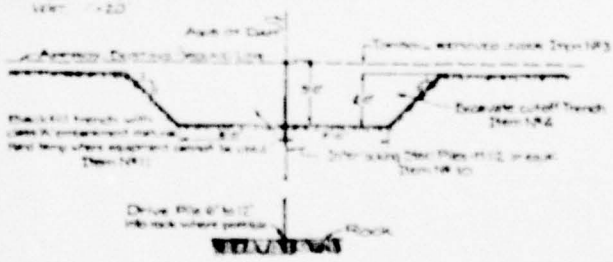


3-A
PROFILE ON AXIS OF DAM

SECTION THRU CULVERT & GATE TOWER



TYPICAL SECTION THRU DAM
SECTION 3-B



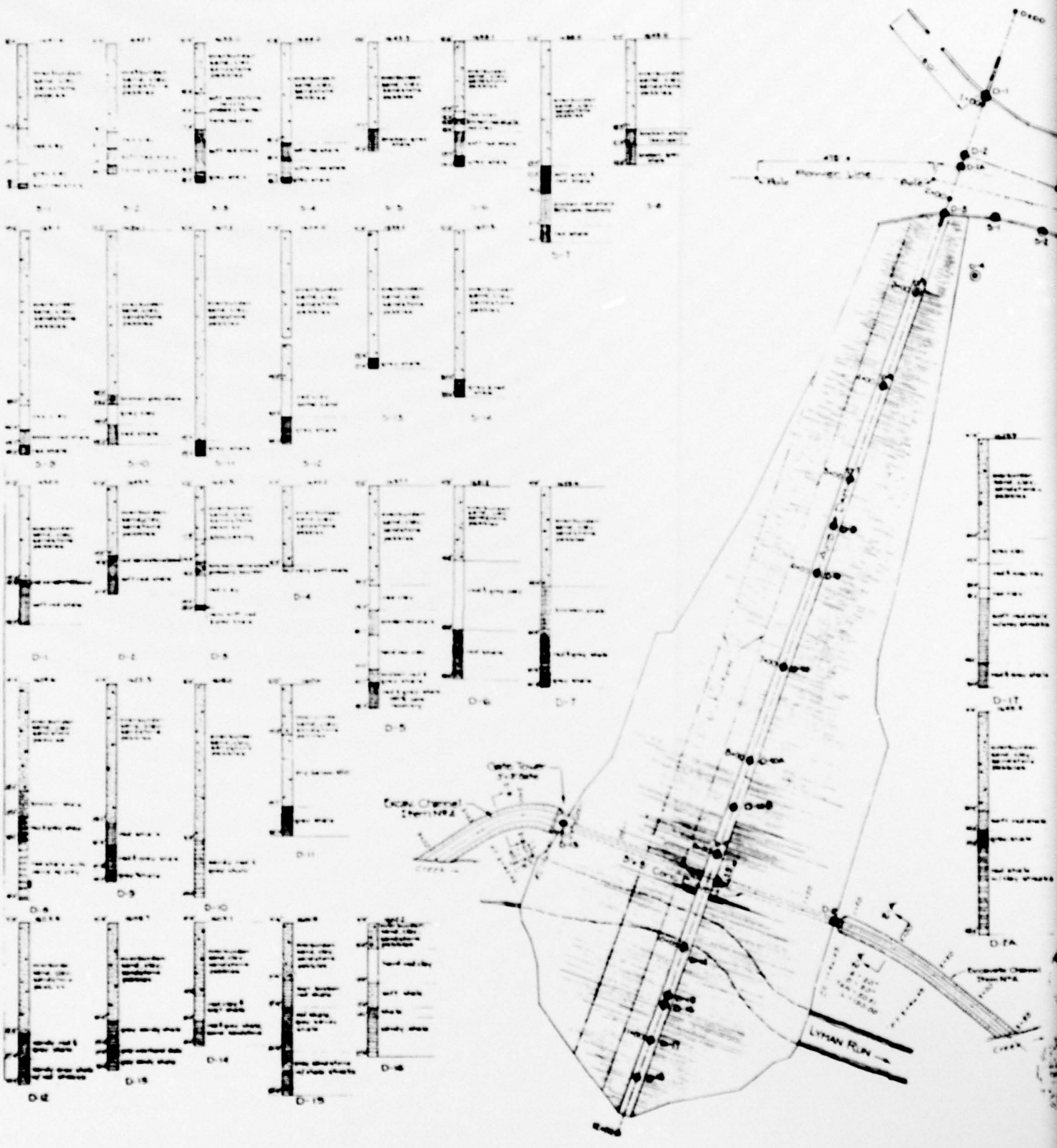
DETAIL 3-C
CUTOFF WALL DETAILS

SUPPLEMENTARY DRAWING
THIS DRAWING SUPPLEMENTS AND SUPERCEDES THE ORIGINAL CONTRACT DRAWINGS

REVISED	THE GENERAL STATE AUTHORITY	PROJECT NO GSA-170-5
	APPROVED: EXECUTIVE DIRECTOR	THE LYMAN RUN LAKE & DAM
	APPROVED: DIRECTOR, PROJECTS	EARTH DAM - SECTIONS
	SUBMITTED: THE CHESTER ENGINEERS	
	APPROVED: DEPT. HEAD, DEPT. OF FORESTS & WATERS	CHESTER ENGINEERS / REGISTERED ENGINEERS PITTSBURGH, PENNA.
	APPROVED: CHIEF, FIRES DEPT. OF FORESTS & WATERS	THE GENERAL STATE AUTHORITY — SHEET NO. 45
	APPROVED: SEC. OF PROPERTY & SUPPLIES	
	ACCEPTED: CONTRACTOR BY	
	ACCEPTED: CONTRACTOR BY	
	ACCEPTED: CONTRACTOR BY	

FIGURE 2

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS


LYMAN RUN

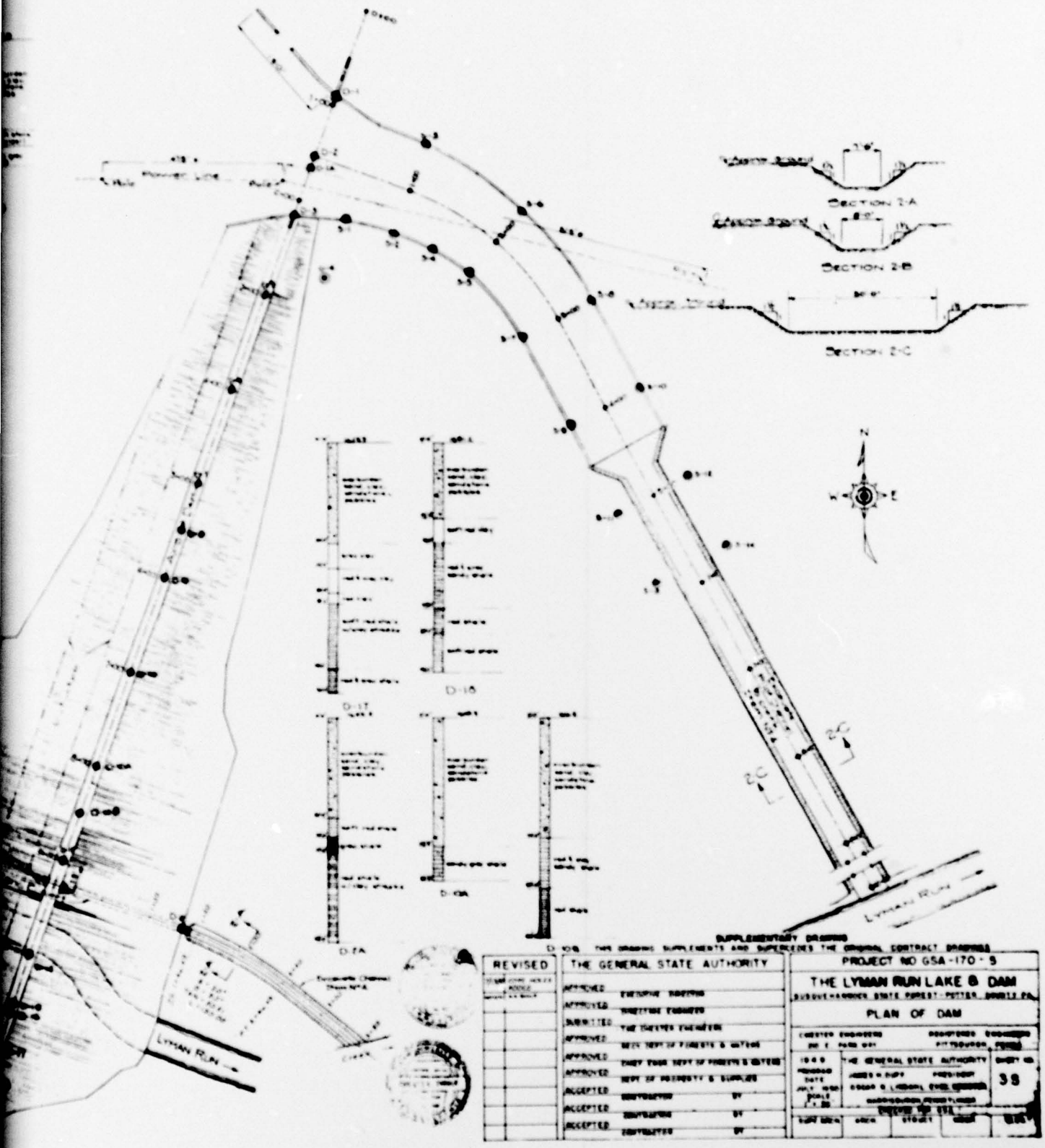
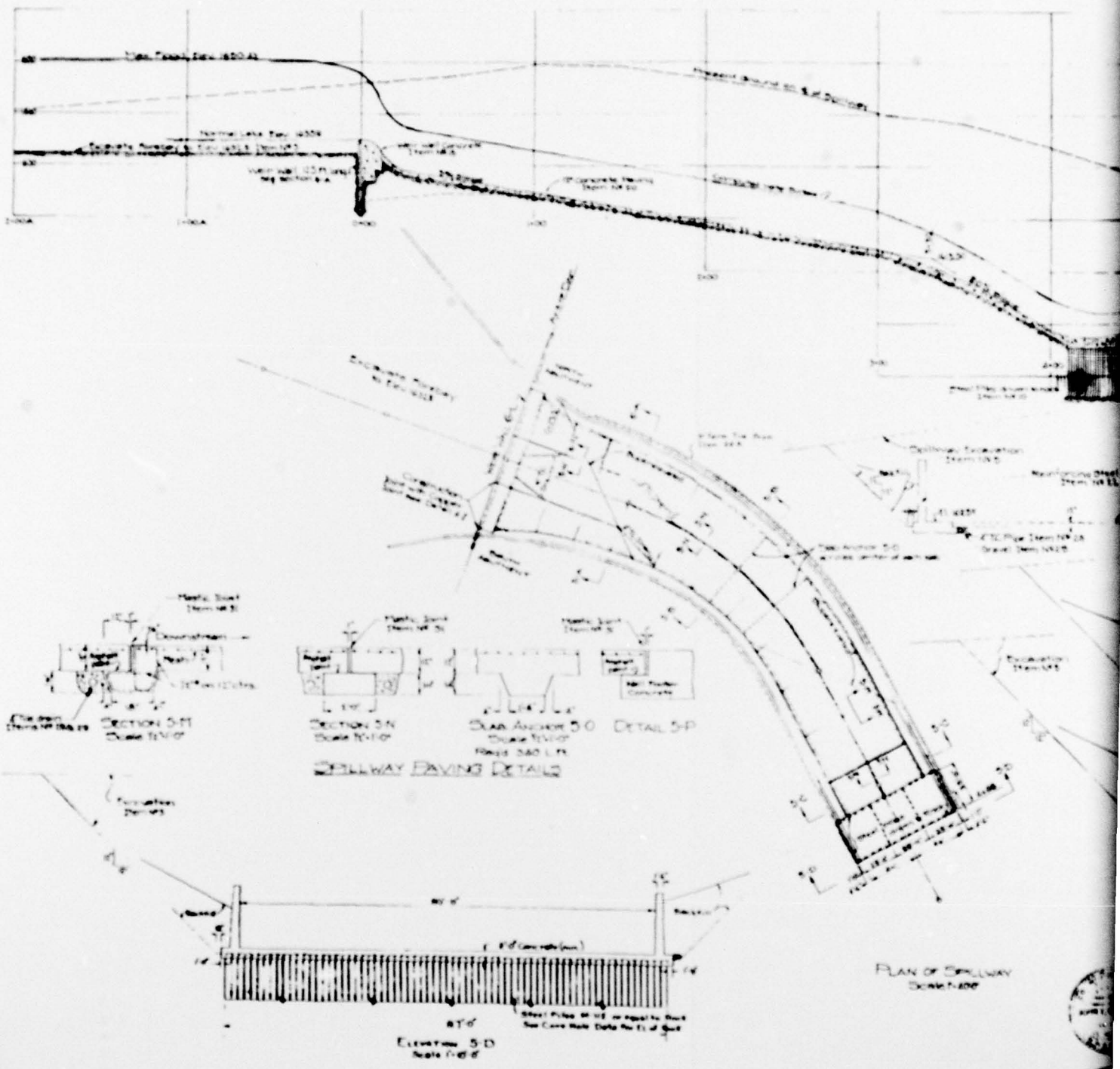


FIGURE 3

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS

1 2


SPILLWAY PAVING DETAILS
PLAN OF SPILLWAY

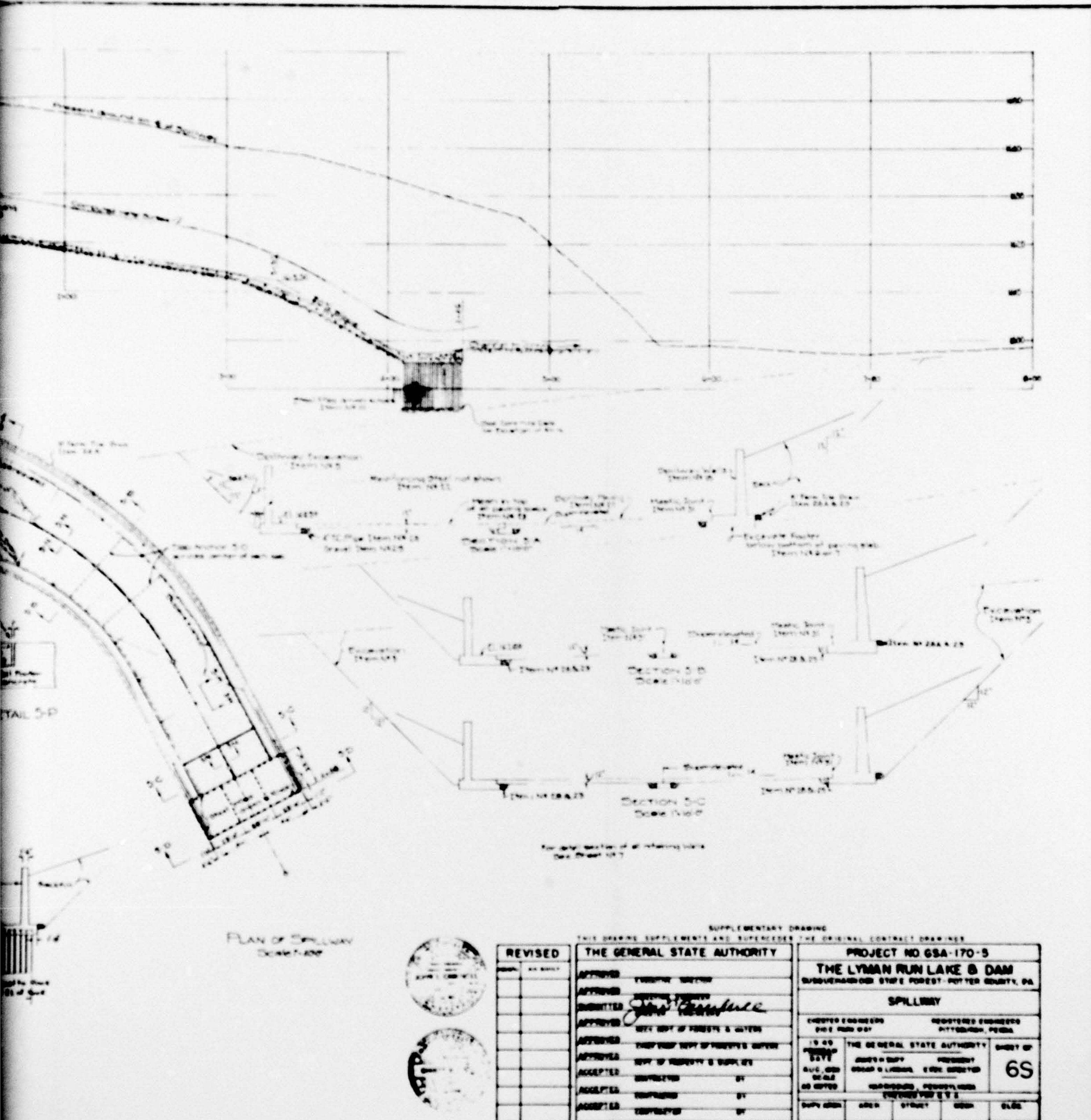
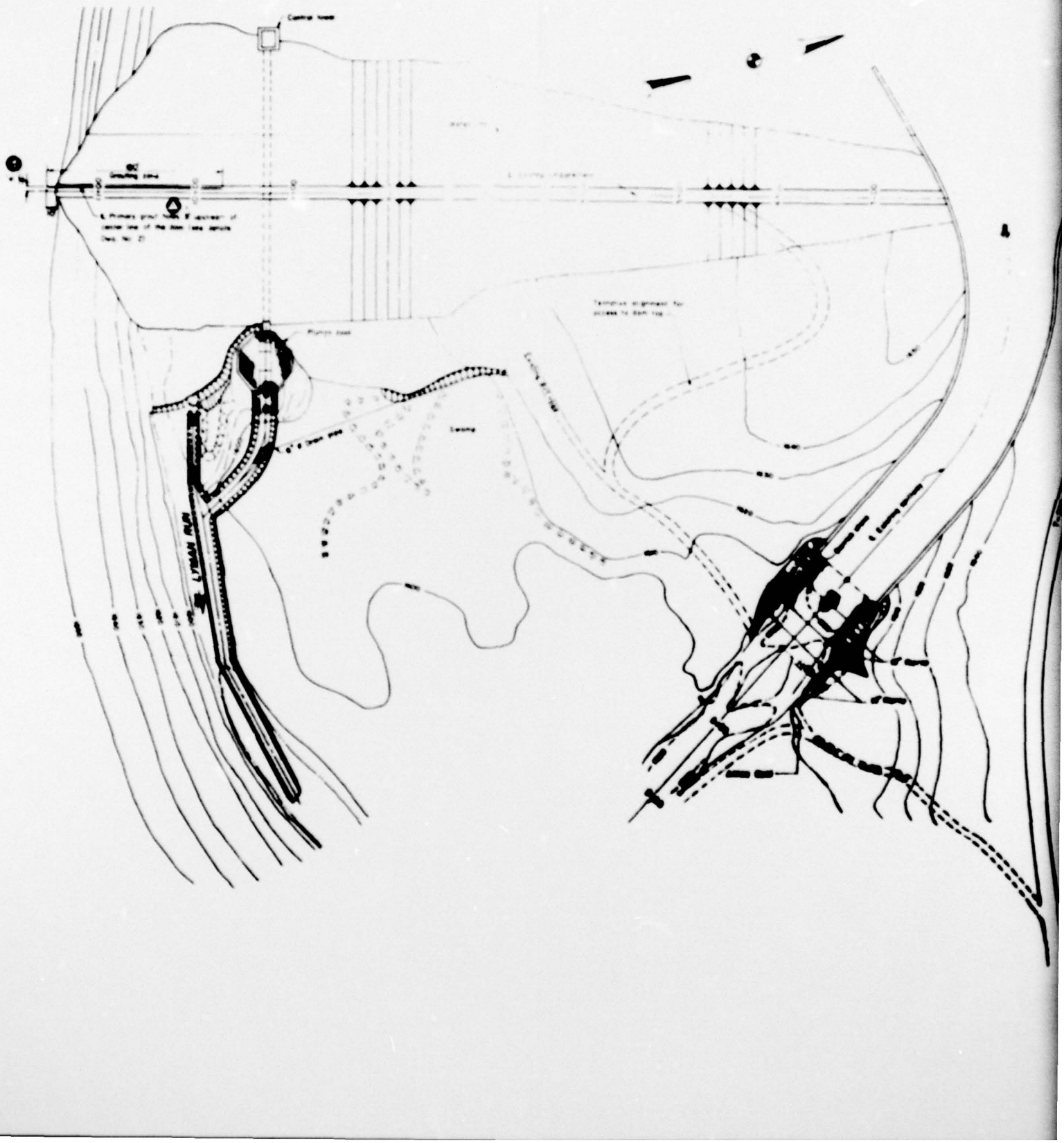
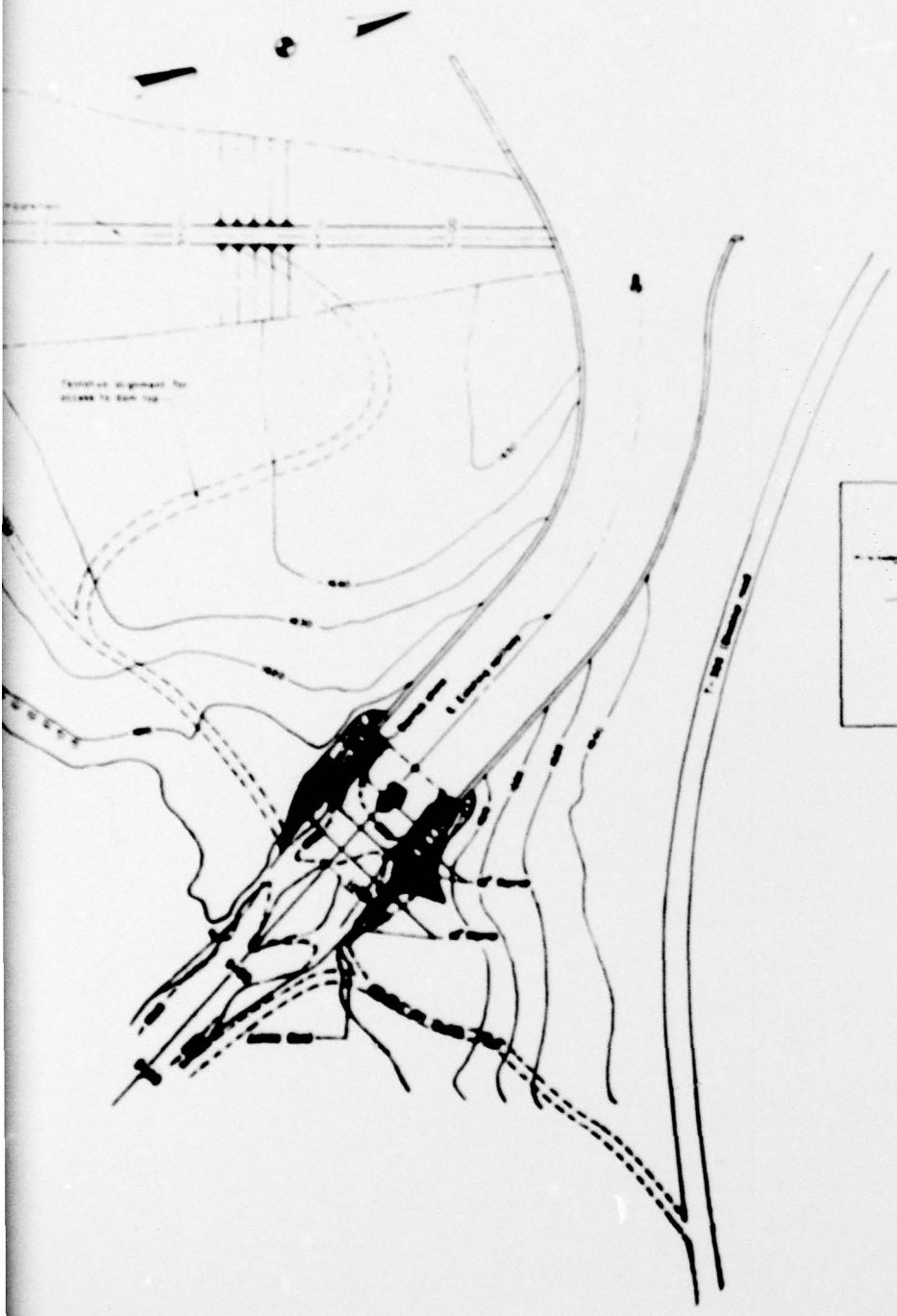


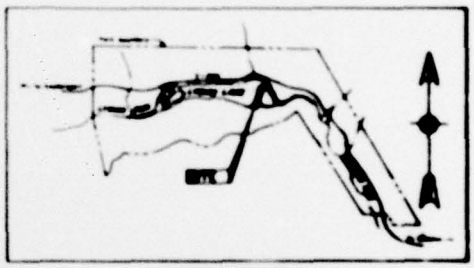
FIGURE 4

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS





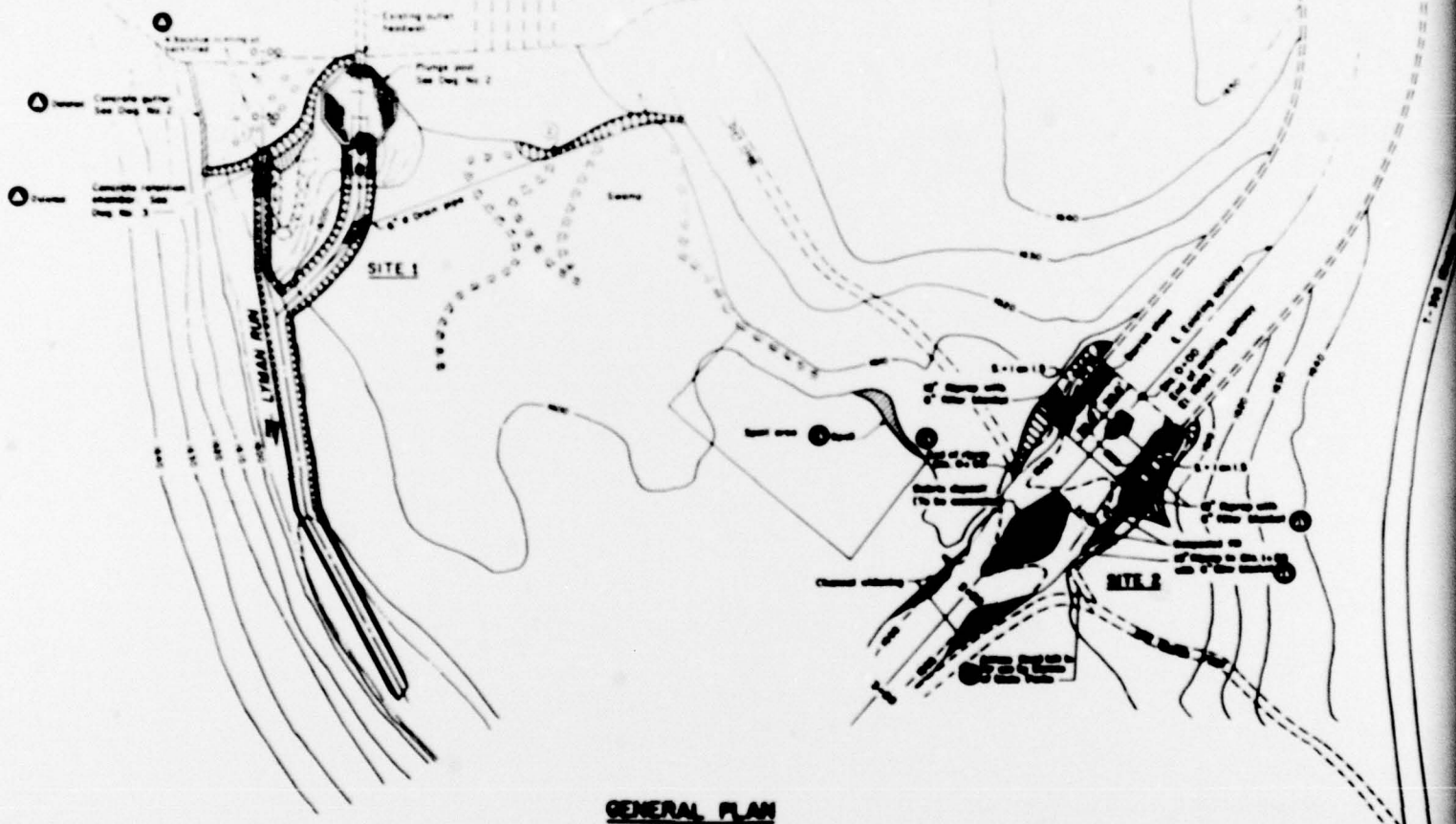
LOCATION MAP



SITE PLAN

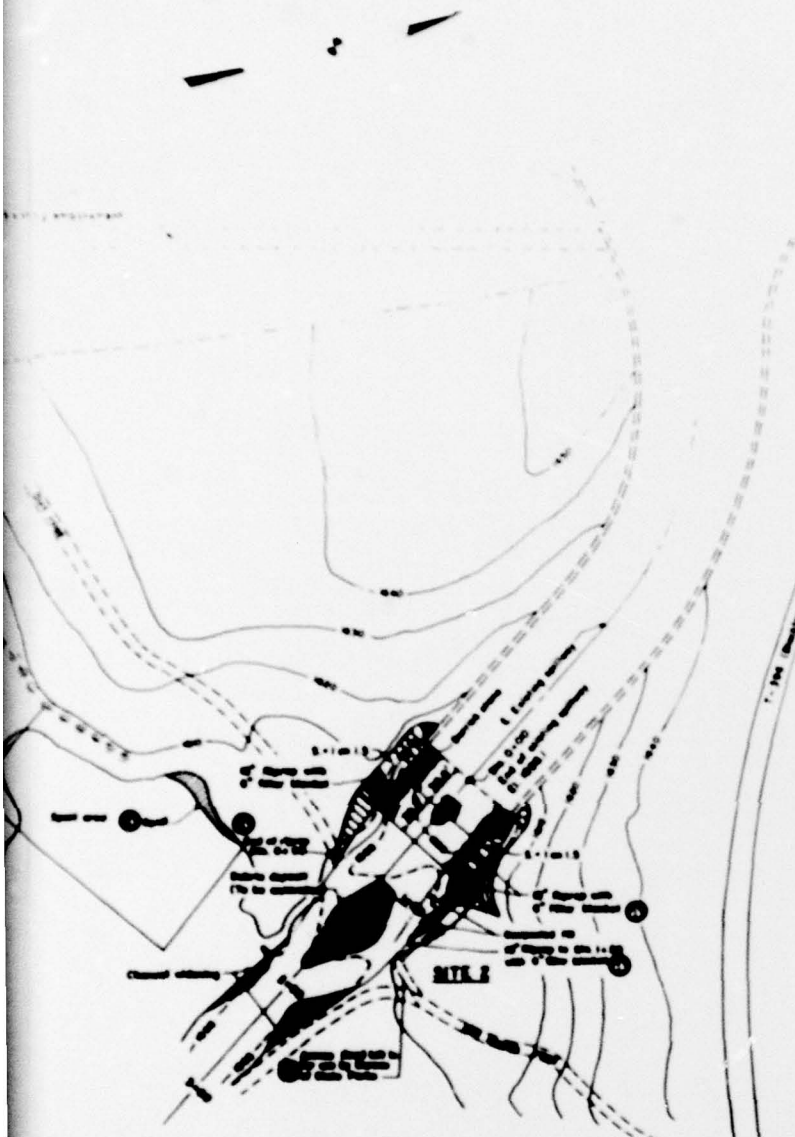
FIGURE 5

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS

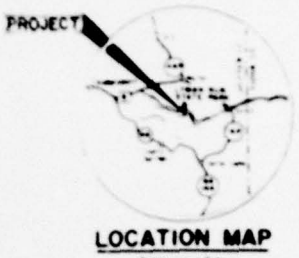


GENERAL PLAN

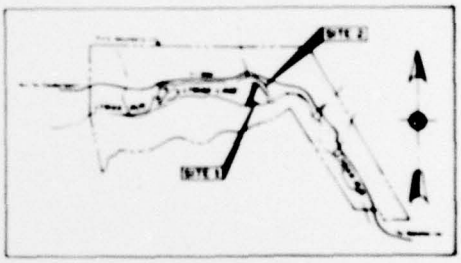
1



PLAN



LOCATION MAP



SITE PLAN

GENERAL NOTES

1. The ...
2. ...
3. ...
4. ...
5. ...
6. ...

PROJECT NO. RS3-6-102.1

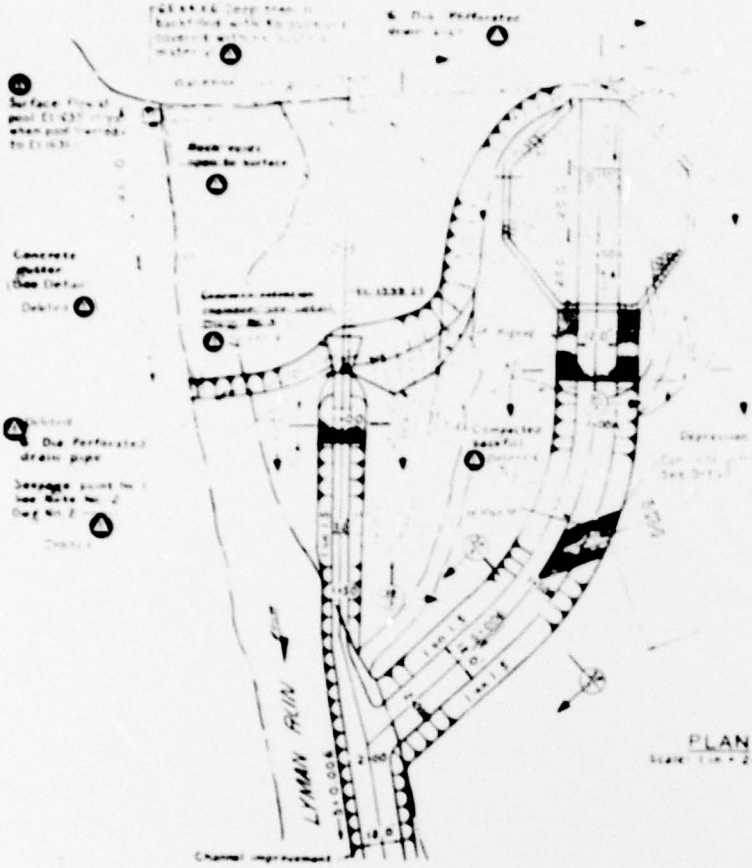
PROTECTIVE MEASURES
FOR SCOUR AND SEEPAGE
LYMAN RUN STATE PARK DAM
POTTER CO. PENNSYLVANIA

GENERAL PLAN

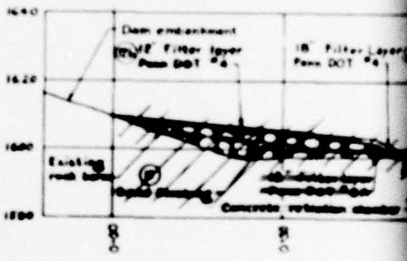
2 of 4

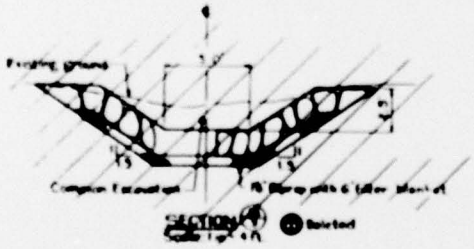
FIGURE 6

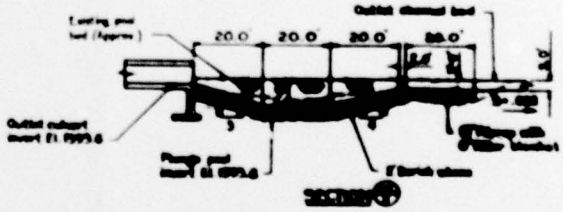
L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS

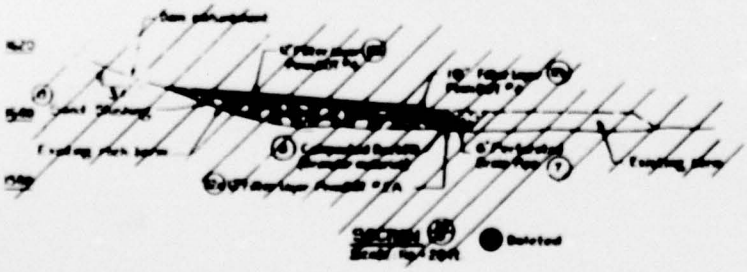


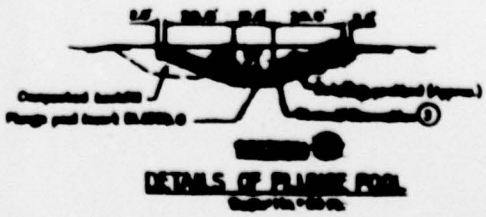
PLAN



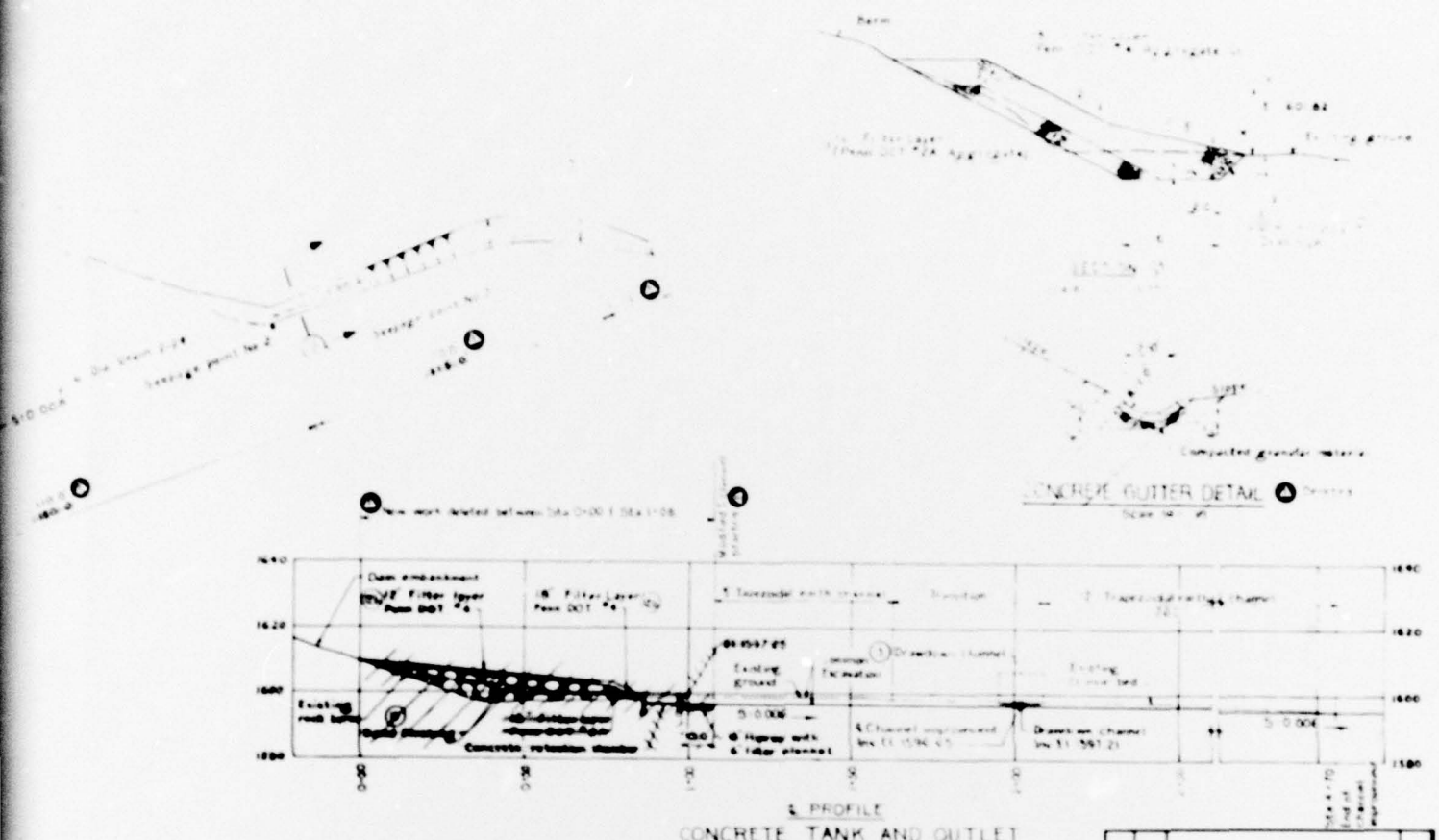






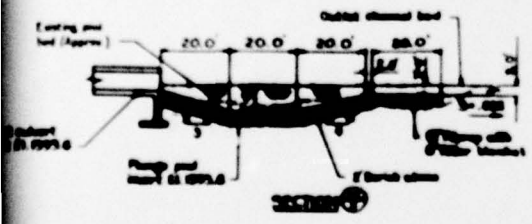


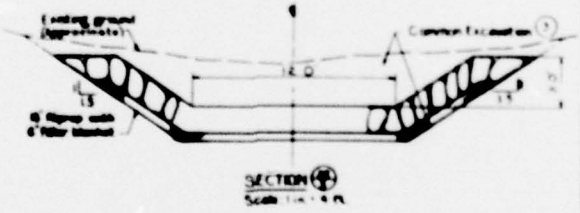
DETAILS OF PLUNGE POOL

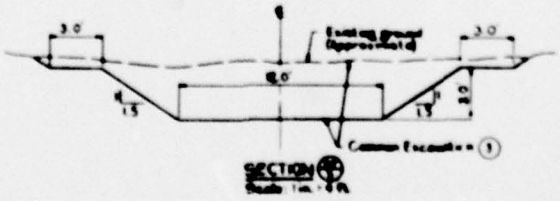


CONCRETE GUTTER DETAIL

& PROFILE
CONCRETE TANK AND OUTLET







DETAILS OF PLUNGE POOL

PROJECT NO R53 6-102 1

PROTECTIVE MEASURES
FOR SCOUR AND SEEPAGE
LYMAN RUN STATE PARK DAM
POTTER CO PENNSYLVANIA

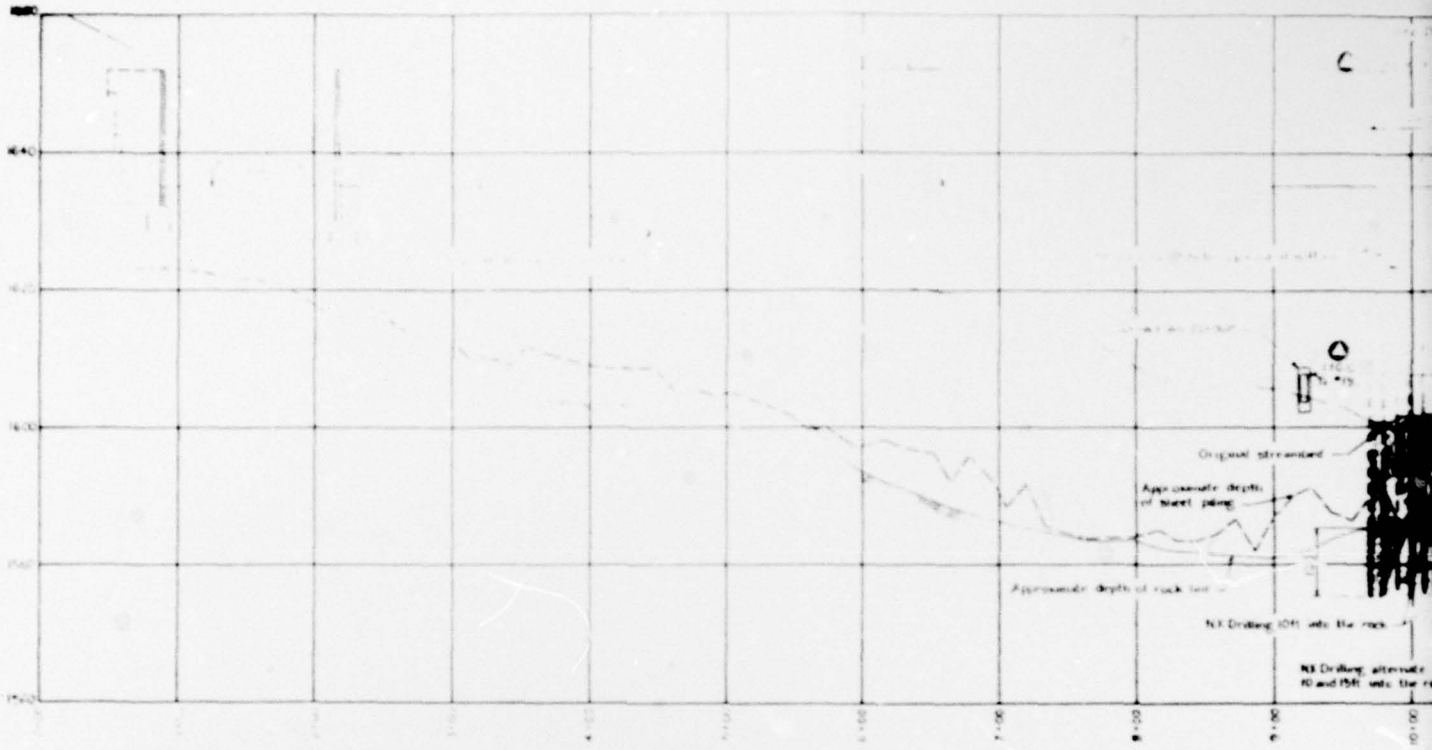
DETAILS AND SECTIONS
SITE 1

3 of 4

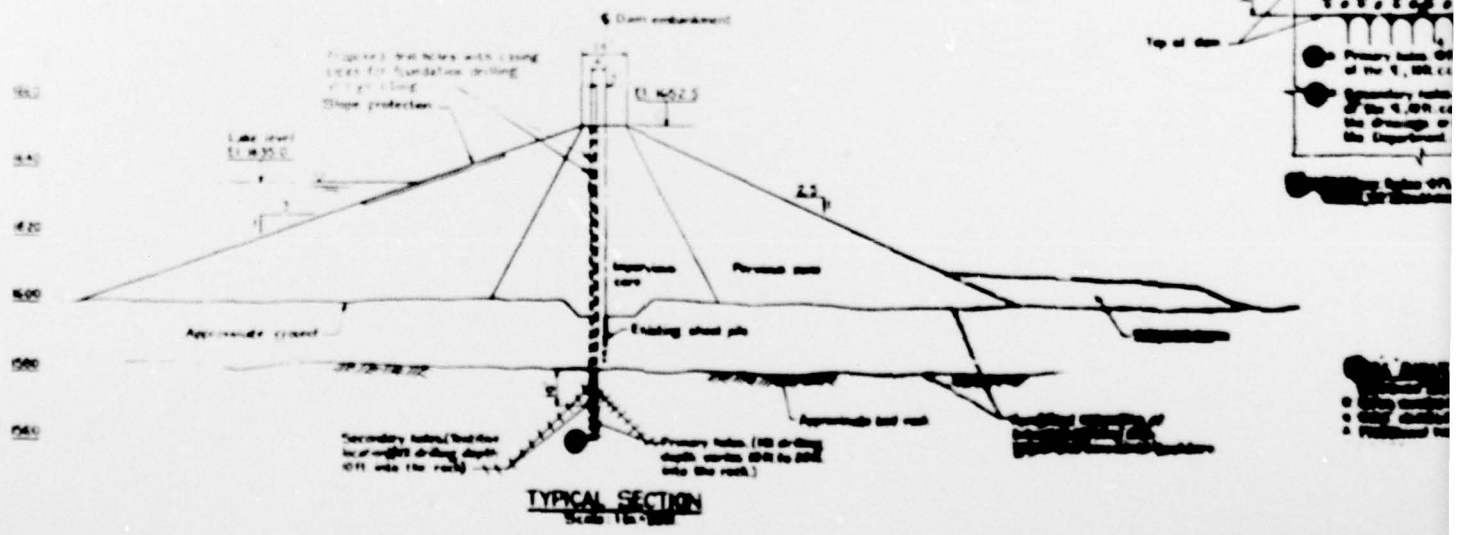
FIGURE 7

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS

12



PROFILE



TYPICAL SECTION

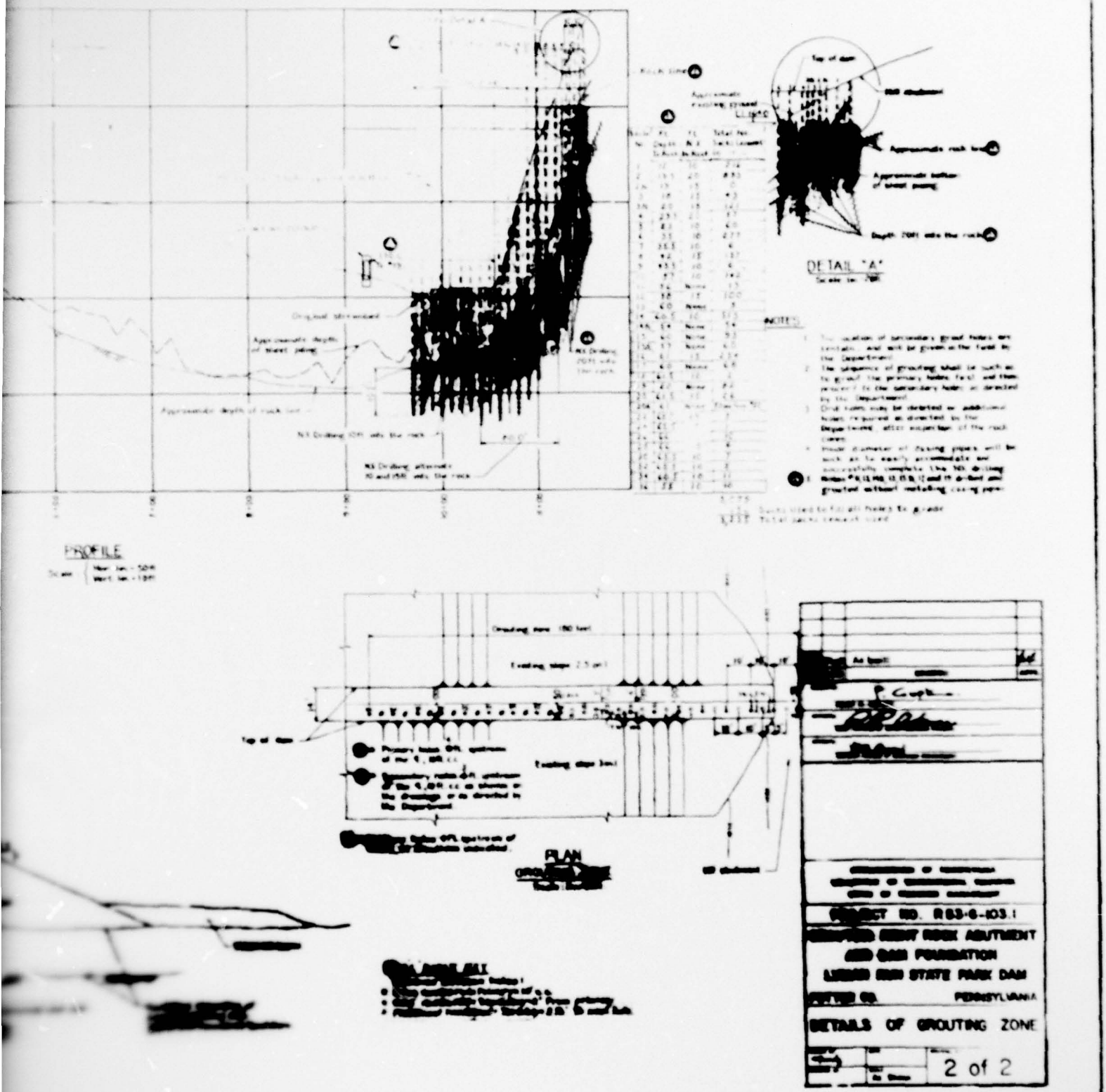


FIGURE 8

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS

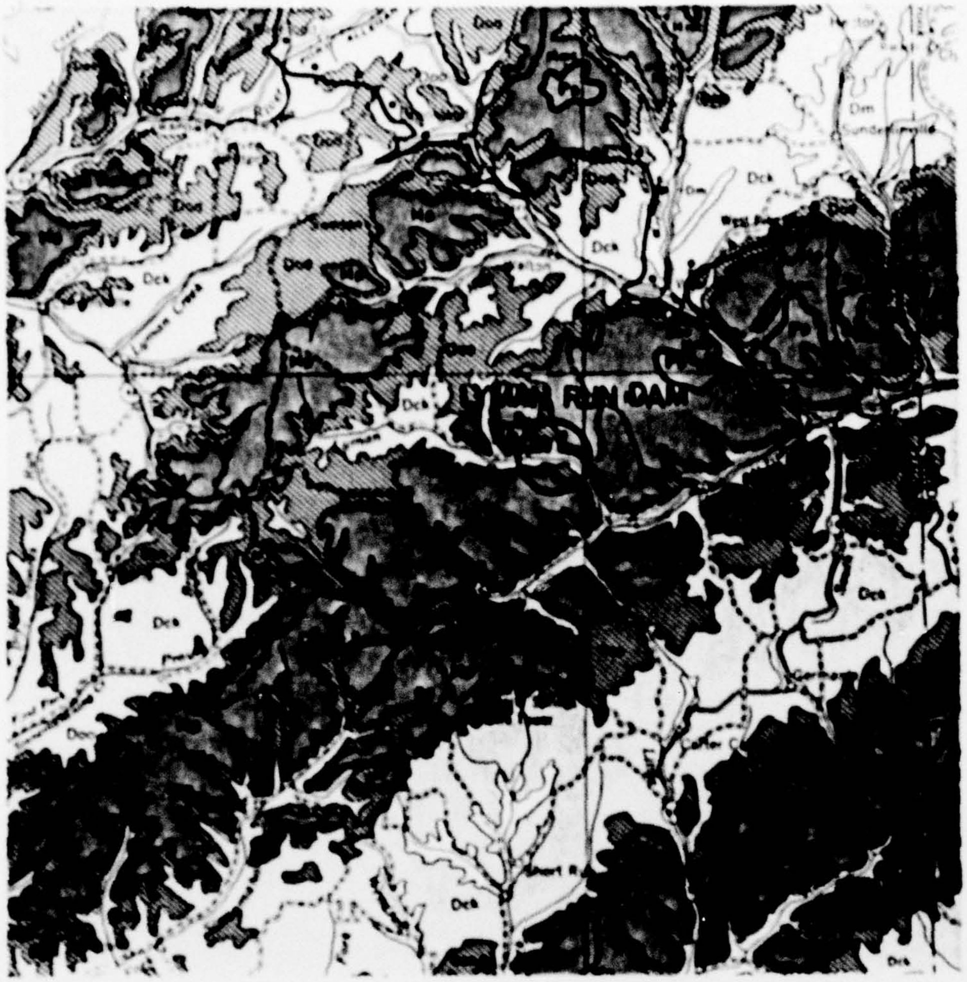
APPENDIX F

GENERAL GEOLOGY

General Geology.

Lyman Run Dam lies within the Allegheny Mountain Section of the Appalachian Plateau Physiographic Province as described by Fennemann (1938). This section is typified by broad, gentle folding. The surface of this area has been reworked by glaciation. The strata underlying the dam are exxentially flat lying.

The dam is underlain by the Catskill Formation of Upper Devonian age. This formation is approximately 2000 feet thick in the area. This formation thickens to the southeast and thins to the northwest. The formation consists of red to brownish shales and sandstone tongues named Elk Mountain, Homesdale, and Shohola.



GEOLOGIC MAP OF LYMAN RUN DAM AREA

Dck	Catskill Formation [illegible]

Scale: 1:250,000